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MADRAS BANANAS

A MONOGRAPH

Madra
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BY

K. CHERIAN JACOB, L.Ag., F.L.S.
(formerly of the Madras Agricultural Service)
COIMBATORE

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A MONOGRAPH

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Madras bananas:..

DEDICATION

To
Sir S. V. Ramamurthy, K.C.I.E., I.C.S.,
Chief Secretary to the Government and
a former Director of Agriculture, Madras

In remembrance of
a long and sustained interest taken by him in the author's humble work, since the day he was at the helm of the administration of Agriculture of the Province of Madras,

And as a token of
the author's high regard for him, not unmixed with the pleasure and the pride which he feels on completion of a work, the very initiative for which he owes to the impetus given by him in his studies on bananas,

This book is most respectfully dedicated
by the author.

PREFACE

The present book is the outcome of a late recognition of the fact that the ' Banana ' is of sufficient economic importance in South India to merit a monograph. The author who has been engaged in the survey, collection and study of the banana of South India during the last fifteen years of his service, gladly undertook the task of writing it up after his retirement in 1944 at the invitation of the Government of Madras and has spared no pains to make the book as complete and useful as possible. While he has freely drawn upon material from other publications on the subject, much that relates to South Indian bananas are based on his original observations and study and have been recorded for the first time.

The question of nomenclature of banana varieties is one which bristles with great difficulties. In a multi-lingual province like Madras, much confusion prevails on account of the same variety going by different names in different localities. The author has attempted, with what degree of success, he leaves the reader to judge, to disentangle the tangled skein and place before him a clear account of the many varieties that exist in this Province properly classified and indicating the synonyms by which they are known.

Both the British and the Metric systems of measurement are adopted in this book. Practical difficulties, it is regretted, precluded the author from confining himself to one uniform system throughout.

Exhaustive references, I regret to say, have not been given here as this work concerns mainly of the classification and description of the South Indian varieties of bananas. Since the manuscript was prepared in 1945, E. E. Cheesman and other authors have published works on the classification and other aspects of bananas of the world.

Varietal names have been adopted after the local names of the various banana varieties to make them easily known to the people of the respective localities. Hence long names have become unavoidable.

The author is grateful to the Government of Madras for the honour done to him, in being asked to undertake the writing of this monograph, and the facilities offered to utilize the material gathered by the author while he was in Government service.

My grateful thanks are due to Rev. Fr. Rapinat, S. J., Professor of Botany, Loyola College, Madras, for kindly rendering short English descriptions of the various banana varieties into Latin. He feels that there may be mistakes in these renderings which the readers will please excuse.

Thanks are also due to Dr. N. L. Bor of the Kew Herbarium for suggesting the new specific name *sapidisiaca*.

It is also a great pleasure to acknowledge gratefully the help and encouragement received from Rao Bahadur Dr. B. Viswanath, C.I.E., D.SC., F.R.I.C., Director of Agriculture, Madras, and Mr. S. N. Chandrasekara Iyer, M.A., the Government Lecturing and Systematic Botanist, Agricultural College and Research Institute, Coimbatore. Of the numerous other friends and colleagues who have helped the author in completion of his work, he should gratefully mention the following : Dr N. Parthasarathy, B.A., B.SC. (Ag.), PH.D. (Lond.), the Second Cane-breeding Officer, Imperial Sugarcane Station, Coimbatore, for kindly investigating the chromosome numbers in the edible banana varieties Nendran, Moongil and Monthan and in the wild species Kattu vazha (*Musa kattuvazhana* K. C. Jacob *sp. nov.*) ; Messrs. M. C. Cherian, B.A., B.SC., D.I.C., the Government Entomologist, Coimbatore, and K. M. Thomas, B.A., M.SC., D.I.C., the Government Mycologist, Coimbatore, for the valuable advice given on the portions of the work relating to insect pests and diseases of banana respectively ; Rao Bahadur A. Savarinatha Pillai, B.A., retired Assistant Commissioner of Income-tax, Coimbatore, Mr. C. M. John, B.A., Oil Seeds Specialist, Coimbatore, Sri G. Venkatanarayana, B.SC. (Ag.), Superintendent, Agricultural Research Station, Nileshwar, and Sri S. Ramaswamy Raju of the Herbarium, Agricultural College and Research Institute, Coimbatore, for going through portions of the manuscript and the useful suggestions made by them ; and the Superintendent of the Government Press, Madras, for his neat execution and the get up of this book.

COIMBATORE,
31*st August* 1946.

K.C.J.

CONTENTS

PAGES

CHAPTER I.—Introduction ; history ; area ; banana and plantain 1–6

Do. II.—Nomenclature of the cultivated banana 7–12

Do. III.—Description of the banana plant ; Abnormalities in inflorescence, abnormalities in shoot 13–20

Do. IV.—Origin of banana varieties ; sports of banana ; ecological-types; variations due to cultural practices ; chromosome numbers, 21–26

Do. V.—Names of the varieties ; artificial key to the varieties 27–36

Do. VI.—Descriptions of the varieties ; commercial varieties of bananas of the Madras province 37–134

Do. VII.—Cultural practices ; economics ; forcing of bananas ; uses other than those of fruits ; diseases 135–154

Do. VIII.—Banana products ; dietetics 155–164

Do. IX.—Analysis of the fruits of varieties of banana 165–166

APPENDIX I.—The various local names of the Madras banana varieties with names of one or more places where they are prevalent ... 167–187

Do. II.—Index of common and local names of the Madras banana varieties 188–194

Do. III.—Comparative statement showing weights of banana fruits and their connected parts in some common varieties ... 195

Do. IV.—Chemical analysis of pulp and rind of (1) ripe fruits, (2) unripe fruits used for culinary purpose of the Madras banana varieties... 196–211

Do. V.—Chemical analysis of some common Indian fruits 212

BIBLIOGRAPHY 213–218

INDEX 219–228

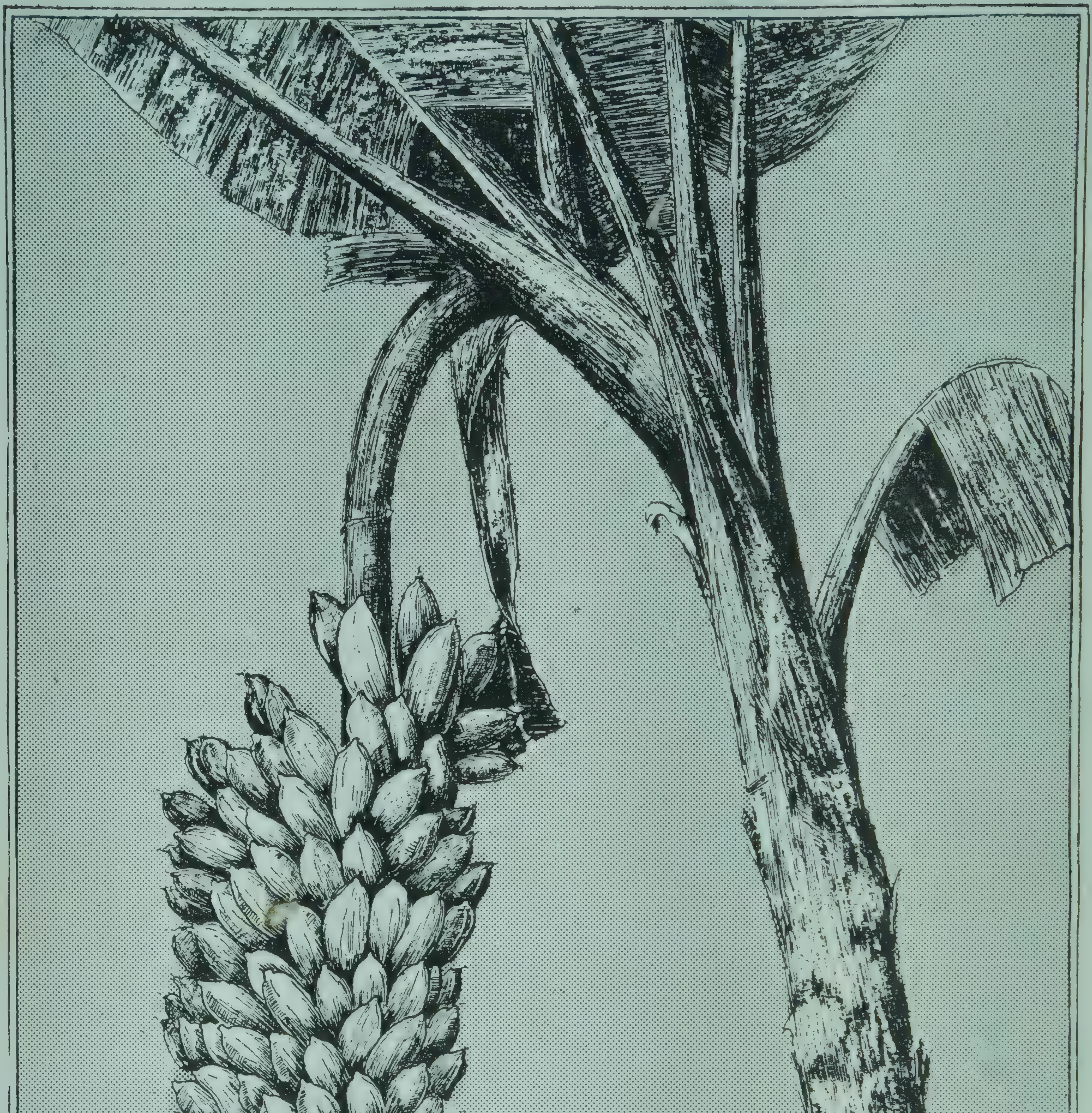
LIST OF ILLUSTRATIONS

Ayiranka rasthali ... ... Frontispiece

FACING PAGE

1 Root system of banana 13
2 Different types of "hearts" 15
3 Different types of banana inflorescences (Plate I) 16
4 Variations in the staminate flowers (Plate II) 17
5 Fasciated inflorescence in a banana 18
6 Multiple bunches in a banana plant 19
7 Double shoot in one rhizome 20
8 Common sports and their mother plants (Plate III) 22
9 *Vamanakeli* 37
10 *Giant Governor* 39
11 *Pedda pachcha arati* 40
12 *Nendran* 42
13 *Moongil* with one "hand" 45
14 *Moongil* with two "hands" 45
15 *Chingan* 46
16 *Maanniyilla chingan* 47
17 *Eththa chingan* 48
18 *Chinali* 49
19 *Kaio* 51
20 *Kadali* 52
21 *Surya kadali* 53
22 *Matti* 55
23 *Namarai* 56
24 *Anai komban* 57
25 *Karim kadali* 59
26 *Gros Michel* 61
27 *Chakkarakeli* 62
28 *Nalla chakkarakeli* 65
29 *Kari vazhai* 66
30 *Chenkadali* 68
31 *Sanna chenkadali* 70
32 *Rasthali* 72
33 *Ayiranka rasthali* 74
34 *Suganthi* 75
35 *Ney poovan* 76
36 *Poovan* 77
37 *Motta poovan* 79
38 *Tiruvananthapuram* 80
39 *Kullan* 81
40 *Nendra padaththi* 83
41 *Pacha naadan* 85
42 *Kaali* 86
43 *Vannan* 88

FACING PAGE
44 *Virupakshi* 89
45 *Sirumalai* 90
46 *Kapur* 91
47 *Krishna vazhai* 93
48 *Kunnan* 94
49 *Venneetu kunnan* 96
50 *Adakka kunnan* 97
51 *Thaen kunnan* 99
52 *Thattilla kunnan* 100
53 *Peyan* 101
54 *Pey ladan* 103
55 *Mayil vazhai* 104
56 *Boothi bale* 105
57 *Kostha bontha* 107
58 *Pey kunnan* 108
59 *Enna benian* 110
60 *Ney mannan* 111
61 *Vennettu mannan* 113
62 *Monthan* 114
63 *Pacha montha bathees* 116
64 *Sambrani monthan* 117
65 *Booditha montha bathees* 119
66 *Nalla bontha* 120
67 *Nalla bontha bathees* 122
68 *Tella bontha* 123
69 *Kuri bontha* 125
70 *Kallu monthan* 126
71 *Ela vazhai* 127
72 *Kaattu vazha* (grown at Coimbatore, flowers erect) 129
73 *Kaattu vazha* (in its natural habitat, flowers drooping) 130
74 *Naaru vazhai* (*Musa textilis Nee*) 131
75 *Naaru vazhai* (showing the non-development of fruits in the absence of any plant of the same species in flower) 132
76, 77, 78 Various types of petioles and lamina bases (I—III) 132
79 Bunchy Top disease 148
80 Bunchy Top affected leaf 149
81 Panama disease 150
82 Anthracnose of banana 151
83 Freakish emergence of bunch 152
84 Composition of the ripe banana 165



AYIRANKA RASTHALI

A

CHAPTER I

INTRODUCTION

The banana is one of the oldest, the commonest and the cheapest of Indian fruits except perhaps, the mango. Mention has been made of it in ancient Sanskrit literature and it has been called the "fruit of the wise men". It is cultivated extensively in South India and is widely consumed. In Europe though the banana was considered as a luxury some fifty years ago its easily digestible qualities have made it very popular even among the working classes in recent years.

While banana is considered merely as an article of food in the Western countries, in India and particularly in the South it forms an article of great and diverse utility. The plants with or without bunches, cut at the bases are extensively employed for decorative purposes. There is hardly any marriage or other gladsome occasion in which the banana plant in bunches does not grace the festive * *pandal*. Ripe banana bunches are used in decoration in Hindu temples in Travancore, Cochin and parts of Malabar during important festivals. Ripe bananas are considered auspicious and are included among the presents given to guests at marriage and other ceremonies. Its popularity as a decorative plant is evident from its inclusion in the design of the paper currency of India.

In India the green or unripe fruit, the "heart", the central axis (*thandu*), the rhizome, etc., are also cooked and eaten along with rice or other food. The leaves are extensively used in the South as a substitute for plates in serving food.

Banana thrives best in tropical uplands with heavy rainfall of even distribution under partial shade. Its large unbroken leaves suggest that the banana is not intended to be grown in exposed places subject to heavy winds. It requires a good deep soil and a sheltered position, as it is easily prostrated by strong winds. The common South Indian banana varieties like *Poovan*, *Pacha naadan*, *Chenkadali*, etc., grow to a height of about 20 feet in the tropical forests in Wynaad (Malabar) and Coorg with no artificial irrigation, while this height is reached only in rare cases in the plains even under irrigation.

Bananas thrive best on organic manures such as compost, leaf mould, decomposed parts of plants, etc., which are available in all heavy tropical forests. This may be another reason for its partiality to heavy tropical forests. *Musa kattuvazhana* K. C. Jacob *sp. nov.*, the only banana found wild in the Madras province, thrives only in such forests.

---

* A shed put up with thatched leaves.

HISTORY

The original home of the banana is believed to be India. It has been cultivated in this country since remote times and Greek, Latin and Arab writers have in their old works referred to the banana as a remarkable Indian fruit. Commerce in banana, it is true, is of comparatively recent development, but the cultivation of the plant dates from earliest historical times, as evidenced by the bas-reliefs of the monuments of Assyria and Egypt which constitute the earliest historic evidence of their existence and adoption for decorative purpose in old times. When Alexander the Great invaded India, he found large tracts of lands in the lower valley of the Indus devoted to its cultivation (68). The existence of seeded varieties such as *Kattuvazha* (*Musa kattuvazhana* K. C. Jacob *sp. nov.*) which occurs wild in the evergreen forests of the Western ghats of the Madras province and *Ela vazhai* [*Musa balbisiana* colla.] which according to Roxburgh also occurs wild in the forests of Chittagong, lends support to the view that India is the ancestral home of the banana. There are reasons to believe that the existing cultivated varieties have sprung from this stock by selection. Many forms and types must have also originated as bud-sports and ecological types.

Local names of some varieties of banana in the Malayalam language are mentioned in the *Hortus Malabaricus* (69), published in the year 1686. The same varietal names are current to this day on the Malabar Coast with slight variations only in respect of two of them indicating the antiquity of banana.

Indigenous to Asia and Africa where many species and varieties are known to exist, the banana is said to have been brought first to America in 1516, by a Spanish Missionary. This grew well without any special attention in some of the tropical American Islands. In the year 1804, it is said that the Captain of an American ship gathered about 30 bunches from Cuba and took them to New York. They were very much appreciated there ; so regular cargoes started and the Captain eventually became the millionaire president of a large fruit company. The first importation of banana of any magnitude to the United States of America was a shipment of about 15,000 bunches from the same place in 1830. For about 20 years thereafter two or three cargoes used to be brought to New York annually. About 1870, bananas were first shipped from Costa

Rica to New York by steamship. It was in 1899 that the banana industry really assumed large proportions by the formation of the United Fruit Company (68).

Bananas are now extensively cultivated in Jamaica in the West Indies, where one could see them growing for miles and miles. Bananas are now grown also in most of the tropical American countries, as Costa Rica, Mexico and certain other Central and South American regions.

Bananas were first imported commercially in small quantities into England from Madeira in 1878 and from the Canary Islands in 1882. In 1901, banana shipments from Jamaica to Great Britain were started by Elders and Fyffes, Ltd. Although refrigerator steam ships were used from the beginning, the venture was not successful until the following year, when the United Fruit Company acted as supplying agents of bananas from both Jamaica as well as Costa Rica. The history of the banana trade is one of the romances of business (68). From small beginnings, started hardly more than a generation ago, it has developed into an industry of first magnitude and importance.

From its original home in India, the banana has been introduced into various countries. Though the Indians have held the fruit in high esteem from time immemorial especially in connexion with their religious ceremonials and social functions, they have not shown any enterprise in the field of trade in order to improve its commercial importance. The result is that to-day the countries into which it has been introduced command the world banana markets, whereas India does not hold any place worth the name.

It may be stated here that the Indian bananas could easily be exported to Western countries without much deterioration in transit. The behaviour of the fruits of some important South Indian varieties under different conditions of temperature is given hereunder. Unripe, but mature fruits of the variety *Rasthali* ripened satisfactorily when preserved at 68°, 60° and 56°F. after two, three and four weeks respectively, developing a good colour. The fruit was chilled at 50°F. Unripe, but mature fruit of the variety *Vamankeli* (Cavendish) was chilled even at 56°F. and did not ripen. It ripened satisfactorily at 60° and 68°F. and developed a good yellow colour. Such development of good yellow colour is well marked in the case of fruits harvested before the cold season. The unripe fruits of the varieties *Sirumalai* and *Poovan* were chilled at 52°F. but they ripened satisfactorily at 56° F. after three weeks. The fruit of *Chakkarakeli* remains in good condition for 5 weeks at 56° F. (43)

AREA

The cultivation of banana is comparatively easy and it also yields a quick return. Still it is one of the crops that has not received as much attention as it ought to have in the history of scientific agriculture in this country.

The banana is being grown in scattered areas in different Provinces in India, and it is in Madras that it claims the largest acreage, at present of about 144,000 acres. The increase in acres in Madras during the 14 years (1918 to 1932) was, however, only 25,000 acres.

Jamaica alone, in spite of its limited extent of area, exported as early as 1912 about 22¼ millions of banana bunches, i.e., about half of the quantity imported into the United States of America, or about 25 per cent of the total annual yield of the banana bunches in the Madras province, taking 500 bunches as the average yield per acre per annum (68).

The area under bananas in the Madras province has not shown appreciable increase on account of the high cost of transport and absence of adequate transport facilities which militate against the development of the trade within the country. To give an instance, at Khandavalli, a village 9 miles to the east of Tanuku in the Godavari district on the Madras and Southern Mahratta Railway, the price of *Rasthali*, a superior variety of banana, was only 2½ annas per 100 fruits, while at Madras, 367 miles away, the price ranged from Re. 1–4–0 to Rs. 1–8–0 per 100, i.e., about eight times the cost in Godavari. The Madras dealers are not importing Khandavalli produce on account of the prohibitive railway freight. There is therefore no incentive for extending the banana cultivation in this locality on account of the prevailing low price and want of transport facilities.

To show that prohibitive railway freight could cripple banana trade, another instance could be cited. Till about 15 years ago, before the remodelling of the meter gauge into broad gauge, Kulittalai in the Tiruchirappalli district was an important banana exporting centre, for trade dealings with Hyderabad (Deccan). Now after the conversion of the meter gauge into broad gauge, the freight is so increased that the trade in banana has dwindled and in consequence the area under banana is correspondingly reduced.

Another reason for the stagnation of banana cultivation is, as already stated, the high cost of its cultivation and the poverty of the Indian ryot. A possible way for the large-scale cultivation of banana is that the project be taken up by companies with large capital as in the West Indies. The Government, if they are interested in the development of this trade, could also help to provide facilities for the production, transportation and disposal of the produce.

BANANA AND PLANTAIN

Banana, bonana, as originally spelt, is the West Indian name for Musa. It is now commonly applied to all table varieties in the Western countries ; but on the Malabar coast of the Madras province, the term banana is applied to *Nendran*, the variety commonly known in the Western countries as plantain. The term plantain is popularly attributed by Westerners to varieties with persistent withered bracts and staminate flowers, large fruits of a foot in length which are laxily held on the bunch and usually cooked and eaten ; in India the term plantain is applied to the banana of the Westerners. There is evidence to indicate that this term was in use even during the time of the East India Company. When India aspires to get her share of the world trade in banana, it will be a great handicap, if she alone were to stick on to the term plantain for the banana of the Westerners. The adoption of the name banana instead of plantain will, I venture to think, bring into line the Indian trade nomenclature with the rest of the world.

The application of the term plantain by Westerners to the varieties of banana with persistent staminate flowers is also not correct because of the reasons given hereunder. Botanists from the time of Linnæus, due to the non-availability of the numerous types of bananas to them, regarded the plantain described above, i.e., the type of banana with persistent staminate flowers and long fruits as separate species from the rest. The author has, however, been fortunate in collecting a wide range of types of banana ; and a critical study made by him of the varying nature of the characters of these types, both in the field and laboratory for about 15 years, suggests the conclusion he has arrived at and dealt with in the chapter on the nomenclature of the edible banana.

Linnæus, Willdenow and other early botanists regarded the persistence of the staminate flowers with large fruits held in a lax manner on the bunch as specific characters. These long fruits are eaten after cooking. Linnæus named this plant as *Musa paradisiaca* L. and it is the plantain of the Westerners. The variety *Nendran* of the Malabar coast, which is generally known there as banana, comes under this species. Linnæus, Willdenow and other early botanists regarded all other types of banana which have the following characteristics, viz., small fruits held compact on the bunch, softening of the pulp when ripe so as to enable ready consumption and dropping of withered bracts and staminate flowers, as a separate species. Linnæus named this as *Musa sapientum* L. and it is the banana of the Westerners.

The author has shown in the chapter on the nomenclature of the edible banana that all these characteristics given above, viz., persistence of withered bracts and staminate flowers, large fruits laxily held on the bunch, fruits eaten after cooking, etc., are not peculiar to *Musa paradisiaca* L. alone, but are also found in typical examples of *Musa sapientum* L. All these characters merge into one another and they constitute, therefore, not different species but are only different varieties, forms or types of a single species. Many typical banana varieties like *Monthan* and *Bontha* have very large fruits, often of a foot in length and weighing a pound each, held in a lax manner on the bunch which are mostly used for culinary purpose. According to the conception of the early botanists, these varieties should be regarded as plantain (*Musa paradisiaca* L.)

Many typical banana varieties like *Kullan*, *Nendra padaththi*, *Chingan*, *Vamanakeli*, etc., have the withered bracts and staminate flowers persistent. According to the conception of the early botanists these typical banana varieties also should be regarded as plantain.

It is not possible, therefore, to draw a hard and fast line between banana and plantain or between *Musa sapientum* L. or *Musa paradisiaca* L. The right course therefore appears to be to regard banana and plantain as synonyms and call all edible varieties as the ***banana***.

CHAPTER II

NOMENCLATURE OF THE CULTIVATED BANANA

The classification of the species of Musa by Linnaeus and Willdenow in the Linnaeus Species Plantarum (97), and of subsequent authors like J. G. Baker (5) was made after a study of a limited number of varieties of banana from probably a limited number of places. F. N. Howes in the Bulletin of Miscellaneous Information, Kew (1928) says " banana classification can only be attempted by one who is resident for some time in one of the banana growing countries and is able carefully to observe the different varieties in their different stages of development." The author was not only resident for about five decades in a banana growing part of a country, but he was also intimately connected with the collection and study of the various banana varieties especially of the Madras province which is very rich in its varieties. The study was extended to varieties got from all over India and Ceylon and also some select ones from Hawaii and Trinidad, for the past fifteen years ; this extended study has led him to revise the specific name of the edible banana as detailed below :—

Characters like persistent or deciduous staminate flowers ; persistent or deciduous withered bracts ; long or short fruits ; tall or short plants ; stout or slender, coloured or yellowish green pseudostems ; long or short petioles ; glabrous or pubescent rachis ; presence or absence of ' heart ' (male cone of flowers) ; purple or white bracts ; reddish or white pulp ; long pedicelled or sessile fruits ; tips of fruits rounded or with long apices ; rounded or 3 to 5-sided fruits and the pulp of the ripe fruit with strong odour or not, cannot be taken as specific characters, as all these sub-varieties are found in the same group of varieties. In the *Vamanakeli* (Canary Islands banana) group, there are three sub-varieties in South India. One with the entire staminate flowers and the withered bracts above the pistillate flowers (fruits) persistent ; the second with the bottom half of the staminate flowers and bracts deciduous and the top half persistent as in the variety Giant Governor of Trinidad and the third with the entire male flowers and withered bracts deciduous as in *Pedda pachcha arati.* The following characters are common in the varieties of *Vamanakeli* group :—the margins of petiole are wide open ; the fruits are 5 to 7 inches long, terete, slightly curved and ripening to greenish yellow, yellowish-green or greenish according to the climatic condition. Cold climate, according to the author, promotes retention of the green colour. Ripe fruits remain strongly attached to the pedicel and the pulp is very soft. In the *Kaali* group of banana also there are two forms, one with the staminate flowers and withered bracts persistent and the other with the staminate flowers and bracts deciduous. The following characters are common in the varieties of *Kaali* group :—the margins of petiole open ; the anthers poorly developed, dark in colour and bent ; the fruits possessed of five sides of unequal width, except the end ones in each hand which have 3 to 4 sides only, almost straight, 4 to 7 inches long, rind (peel) very thick, ripening to greenish yellow or yellow ; the pulp rather firm ; the ripe fruits possessed of good keeping quality ; ripe fruits easily dropping off from the pedicel ; fibre from the leaf sheath very strong in all the varieties in this group. In the *Nendran* group (the plantain of the Westerners) there are two forms, one with withered bracts and withered staminate flowers persistent, and the other with one, rarely two, and more rarely three 'hands' (clustres of fruits in a fascicle) of pistillate flowers, all of them developing into fruits. The following characters are common in the varieties of *Nendran* group :—margins of petiole closed ; fruits often large, one foot long and stout ; pulp of the unripe fruit flesh-coloured and turning reddish on ripening; the pulp tough and often consumed after cooking ; the rind of the well-ripe and over-ripe fruits turning dark in colour ; it has very good keeping quality and the ripe fruits remain strongly attached to the pedicel. From all this it is evident that the persistent or decidous character of the staminate flowers, which Linnaeus and Willdenow considered most important for separating *Musa paradisiaca* L. from *M. sapientum* L., *are not at all stable* characters, and this has been baffling previous workers also. The size, shape, nature of apex and odour of ripe fruit also vary in the varieties of the same group, e.g., in the *Monthan* group of banana, which is generally used for culinary purpose, the weight of a good fruit is about a pound, while about 10 fruits will go for a pound in the variety *Kallu monthan* of the same group. The fruit of *Motta poovan* has no apex, while *Poovan* has a distinct apex. The odour of ripe fruit also varies as in the variety "*Manoranjitham*" of Tiruchirappalli, an ecotype of *Kari vazhai*, which makes itself felt even at a distance of about 25 feet ; but the same variety when grown at Coimbatore, a station about 150 miles away, under almost similar conditions, was found to get devoid of the odour in the course of four generations, so much so that this and the *Kari vazhai* of Coimbatore became identical. The strong odour present in certain varieties is, therefore, only ecological and not varietal and much less a specific character.

The characters emphasised by Baker (in the Annals of Botany) referred to above, viz., stem short or tall, slender or stout ; petiole short or long, etc., are also variable in the same group of varieties, e.g., *Vamanakeli* (*Cavendish*) is a very short and stout plant, while *Pedda pachcha aratti* is a tall plant. *Giant Governor* is a slender plant, while *Vamanakeli* of the same group is robust. Again *Kullan* of the *Kaali* group is a short and stout plant, while *Nendra padathy* of the same group is very tall. Petioles of *Kullan* are very short, while those of *Nendra padathy* are very long. It is evident, therefore, that these characters which Baker emphasises *are also not stable.*

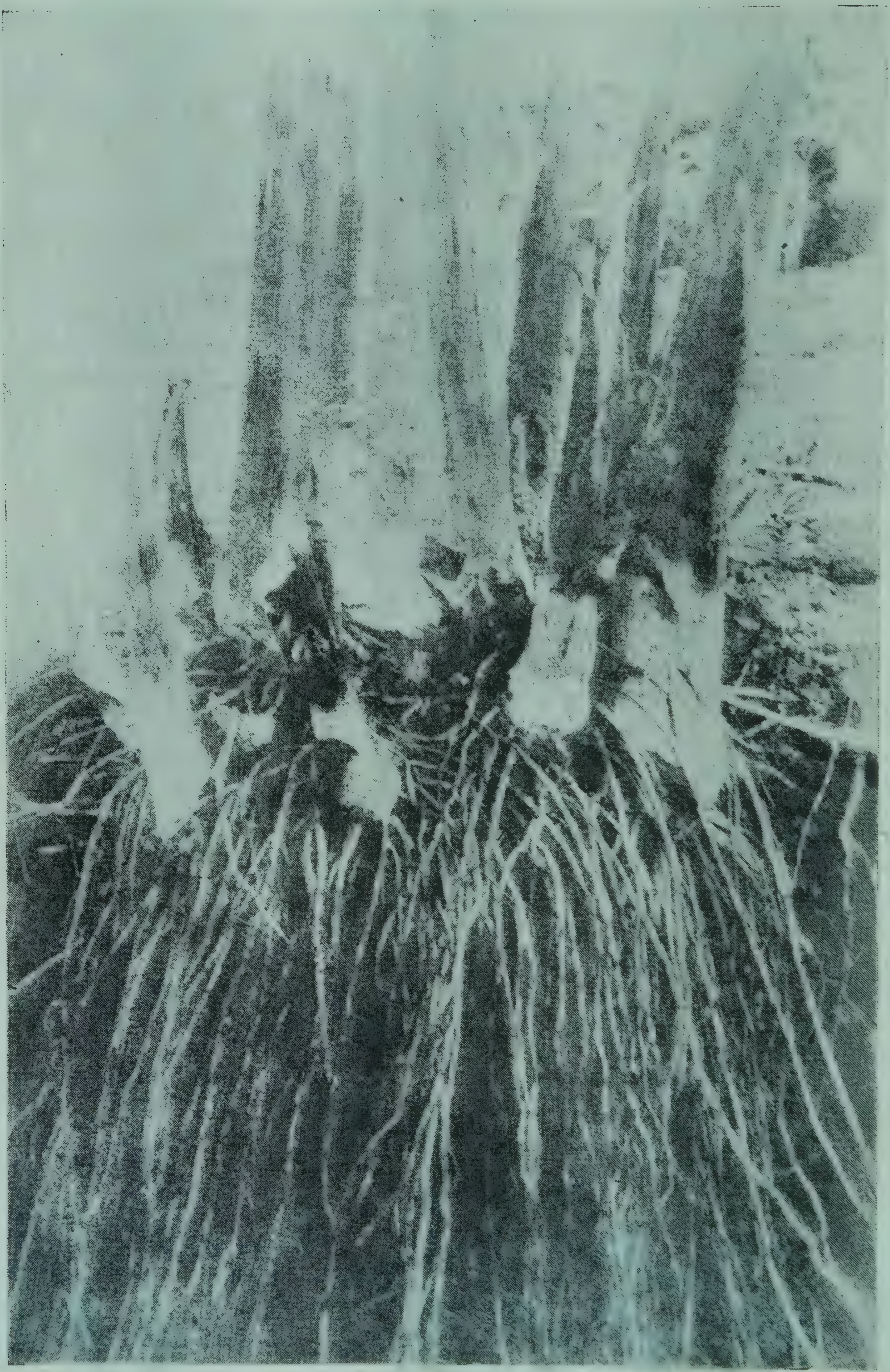
The author adopted the botanical name *Musa paradisiaca* Linn. for banana according to the Flora of the Presidency of Madras by J. S. Gamble, when he started his study of bananas about 15 years ago and planted the eight varieties and five sub-varieties with persistent staminate flowers and persistent withered bracts in pure lines ; and, after confirming their purity of characteristics, the author published an article " South Indian Bananas " in the Madras Agricultural Journal, Vol. XXII, No. 2, adopting these characteristics in the grouping of varieties.

After a few years, as the result of intensive study made especially of the floral parts both in the field and in the laboratory, it was found that *Kullan* and *Nendra padathy*, two typical examples of this group, with persistent staminate flowers and persistent withered bracts, have the stamens poorly developed, i.e., the anthers are irregularly bent or even twisted, thin and dark coloured as in the case of all the varieties under *Kaali* group. This sort of anthers is not found in any other variety, form or type of banana, edible or non-edible. Sometimes at the extreme tip of the staminate ' heart,' when the bunch of fruit is nearing maturity, some stamens, especially in ecotypes and seeded bananas, may be found to possess this sort of anthers, but it is not seen towards the basal region of the staminate flowers in any species or varieties. In such cases it is not only the stamens that are dark coloured but all the parts of the staminate flowers, except the ovary, may be dark coloured and poorly developed. But in *Kaali* group all the parts of the staminate flowers, except the anthers, are well developed and normal. When this character was made out, the other characteristics peculiar to *Kaali* group were easily noticed in these two varieties, i.e., the fruits having three to five sides of unequal width; their dropping off easily from the pedicel when ripe ; the rind being very thick ; margins of petiole wide open and the pulp of the ripe fruit having the taste peculiar to the *Kaali* group. The size of fruits in *Kullan* and *Nendra padathy* is even shorter than Gros Michel and Canary Islands banana, the two well-known banana varieties. *Kullan* and *Nendra padathy* were, therefore, transferred to *Kaali* group. All the other varieties under *Kaali* group are typical of *Musa sapientium* L. with deciduous staminate flowers and deciduous withered bracts, fruits small, etc. This clearly shows that the classification of edible Musa by Linnaeus based on persistent or deciduous staminate flowers, long or short fruits, etc., needs revision. *Musa paradisiaca* L. is the plaintain of the Westerners and this is the variety *Nendran* of the Malabar Coast where it is popularly known as banana. The persistent staminate (male) flowers and the long fruits described in *M. paradisiaca* L. are also found in *Musa sapientium* L., e.g., the varieties *Kullan* and *Nendra padathy* with persistent staminate flowers and small fruits, etc., and the varieties *Monthan, Bontha,* etc., with large fruits of a foot in length, held on the bunch in a lax manner and used mostly for culinary purposes belong to the same group.

These various forms of the edible banana with unstable characteristics cannot, therefore, be separated into different species as Linnaeus and other botanists have done. Because of this wrong nomenclature by Linnaeus, the authors of floras who followed him, used his *Musa paradisiaca* L. and *M. sapientum* L. indiscriminately. Trimen in the Flora of Ceylon and Cooke in the Flora of the Presidency of Bombay cite *Musa sapientum* L. as synonym of *M. paradisiaca* Linn ; while Hooker in the Flora of British India, T. Dyer in the Flora of Tropical Africa, Haines in the Botany of Behar and Orissa and Bailey in the Cyclopedia of American Horticulture cite *Musa paradisiaca* Linn. as a variety of *M. sapientum* Linn. ; K. Schum in Pflanzenreich cites *Musa sapientum* Linn. as a sub-species of *M. paradisiaca* Linn. and Baker in the Annals of Botany cites *Musa paradisiaca* L. as a sub-species of *M. sapientum* L. In all these works, importance is given to the character, the staminate flowers' persistency or otherwise. I, therefore, combine the two Linnaean species of edible Musa, viz., *Musa sapientum* L., and *Musa paradisiaca* L., into a single species, *Musa sapidisiaca* K. C. Jacob nom. nov. (*Musa sapientum* L. et *Musa paradisiaca* L.). The new specific name " sapidisiaca " is the combination of the first part of the specific name *sapientum* and the last part of the specific name *paradisiaca.* This new name is not a combination, but a *nomen novum.* Now, the specific status of *Musa Cavendishii* Lamb. is much less untenable for the reasons already given for *Musa sapientum* L. and *Musa paradisiaca* L. and it is, therefore, reduced to a variety of *Musa sapidisiaca* K. C. Jacob nom. nov. and the new varietal name is *Musa sapidisiaca* K. C. Jacob var. *cavendishii* (Lamb.) Jacob.

Description of Musa sapidisiaca K. C. Jacob *nom. nov.*—Combine the descriptions of *Musa sapientum L.*, and *Musa paradisiaca L.*

Latin—Musa sapidisiaca K. C. Jacob, nom. nov. includit descriptiones datas circa *Musa sapientum L.*, *et Musa paradisiaca L.*



1. A BANANA PLANT WASHED FREE OF SOIL SHOWING THE ROOT SYSTEM AND THE RELATION OF THE SUCKERS TO THE MOTHER PLANT. (COURTESY OF THE UNITED FRUIT COMPANY)

CHAPTER III

DESCRIPTION OF THE BANANA PLANT

Bananas belong to the family Musaceae. The plant is a rapidly growing perennial herb perennating through underground rhizomes. The rhizome is the banana plant's real stem on which large buds, or 'eyes' develop. When the bud remains underground the leaves are reduced to leaf sheaths only. Tips of these leaf sheaths, as the bud emerges out, elongate, at first into a narrow appendage representing the midrib of the leaf; then the first true leaves emerge with very narrow leaf blades in the form of narrow arrows, popularly called sword leaves. These sword leaves soon change to moderately broad leaves, as the buds grow in size and give rise to sword leaf or broad leaf suckers. The propagation of banana in this country is made through these two types of suckers. Some varieties produce a few, and others many suckers. In the West Indies, however, the rhizome, commonly called a 'head' or 'bulkhead' is cut up into sections commonly called 'bits', and planted. In the course of time each sucker that is allowed to grow up develops a rootstock (rhizome) of its own with independent root system.

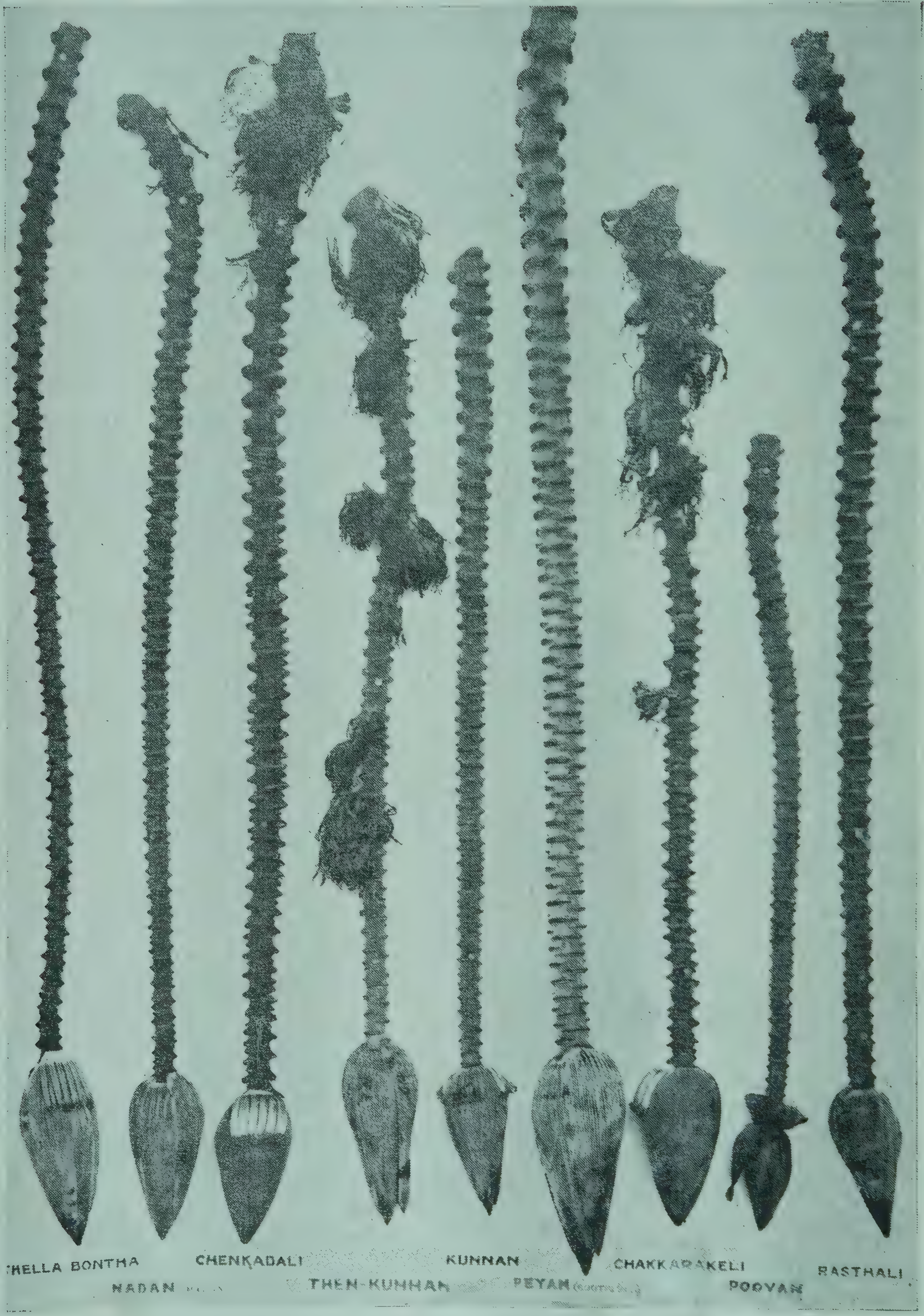
The planting of sucker is definitely better than planting of bits for two reasons. In the first place the crop will have a start of about two months. Secondly the percentage of germination is cent per cent while there are failures in the case of bit planting. Saving of two months is a great thing in a crop of 10 to 14 months duration.

The roots are of two sets, the horizontal and the vertical; the horizontal push out in all directions, while others, from the base of the rhizome grow vertically downwards. The main roots are fleshy and like cords. These roots do not branch naturally; but short thread-like roots grow out and on these, and on the main root behind the growing portion, are the root-hairs which absorb plant food from the soil.

Growth takes place hereafter rapidly, the new leaf pushing up through the centre of the pseudostem which is tightly rolled and pointed and spreads out on emergence, giving a very graceful, palm-like aspect to the whole plant. The stem increases in height and thickness, until it is several feet from the ground and then it flowers. The pseudostem sometimes attains a height of 23 feet in this country, but those growing in the rich alluvial places along the Atlantic Coast of Central America rise higher sometimes reach a height of 30 feet with a diameter at base of 18 to 24 inches. What seems to be the stem or the trunk of the banana plant is, in reality, only a compact mass of overlapping leaf-sheaths. As the plant grows, the older leaf-sheaths are pushed outward by the young growing leaves within and a smooth strong pseudostem (or pseudotrunk) is formed. As the plant approaches middle age, a primordial flower-bud originates from the rhizome, pushes up through the centre of the pseudostem, bearing about 20 per cent of the total number of fully developed leaves that the plant would eventually produce. These leaves are attached to the stalk of the flower-bud at varying distances closer towards the base and farther apart towards the flower-bud. They emerge before the flower-bud emerges. The last 2 or 3 of these leaves are the shot blades. The flower-bud (inflorescence) thus comes out after all the leaves including the shot blades have emerged. The inflorescence which is a spike, is bent over and drooping in the cultivated varieties, but erect in some wild ones. In describing the various parts of the inflorescence of the cultivated banana it is assumed that the inflorescence is erect. The basal portion of the flower-bearing axis, which is commonly termed peduncle, is often glabrous, but in varieties like *Kadali*, *Chakkarakeli*, *Kari vazhai*, and *Matti* it is pubescent. Its length and thickness are variable in the different varieties, being only 6 inches long in *Chingan*, *Namarai* and *Nalla chakrakeli*, or as long as two feet in the various types of *Monthan*.

The position of the fruit-bearing axis is from right angle to acute angle, or bent over and parallel to the main stem according to the variety and the heaviness of the bunch. The naked portion of the axis, from where the deciduous staminate flowers are shed, is generally pendulous and nearly parallel to the pseudostem of the plant in varieties, viz., *Krishna vazhai*, *Kadali*, *Poovan* and *Monthan* (Plate I, Fig. 1). But in varieties like *Rasthali*, *Ney poovan*, *Anaikomban* and *Chakkarakeli* the naked axis continues to be in line with the main rachis for 6 inches to 12 inches and then becomes pendulous (Plate I, Fig. 2). There is a third type where the naked axis continues to be at an angle except the extreme end in some cases, as in varieties *Namarai*, *Kadali* and *Surya kadali* (Plate I, Fig. 3).

Bracts are large, spathaceous, mostly of various shades of purple colour, ovate, closely imbricate, spirally arranged, often deciduous, and in some varieties the withered ones persist. They are the largest at the bottom region of the inflorescence covering its whole length and protecting the pistillate flowers. Progressively they are smaller towards the distal end of the axis. But in *Eththa chingan* the bracts are white.


HELLA BONTHA
NADAN
CHENKADALI
THEN-KUNNAN
KUNNAN
PEYAN
CHAKKARAKELI
POOVAN
RASTHALI

2. DIFFERENT TYPES OF "HEART" AND TOP PART OF RACHIS

Flowers are arranged in two rows, one above the other in fascicles called 'hands'. The number of flowers varies from 7 to 14 pairs, according to the varieties and the position of the fascicles on the rachis, the basal ones having more. They are often monœcious, the lower ones being female (pistillate) and the upper ones being male (staminate), but rarely all pistillate. The ovaries of the pistillate flowers are very much bigger than those of staminate flowers, but they bear rudimentary stamens. These ovaries develop parthenocarpically into fruits and in some varieties fertilisation takes place and seeds are formed when grown along with or in the vicinity of seed bearing species. The pistillate flowers are followed by staminate flowers which are borne on rudimentary ovaries. The staminate flowers which may be persistent or deciduous are brought to view as the flower bearing bracts of the cone-like inflorescence, usually termed 'heart', opens out. The size and shape of the 'heart' differ in the various varieties. It is 3 to 10 inches long when the bunch is half-mature and the shape varies from ovate to narrowly lanceolate.

The inflorescence varies in different varieties as described below :—

The common type of inflorescence is the one in which the bottom region bears pistillate flowers which develop into fruits followed by deciduous staminate flowers. Varieties, viz., *Krishna vazhai*, *Kaali*, *Poovan* and *Monthan* exhibit this characteristics (Plate I, Fig. 1). Generally the 'heart' continues to produce staminate flowers till the fruits ripen but in the *Kaali* group of varieties, the 'heart' withers and dries up long before the maturity of the bunch. It is very large in the variety *Kallu monthan* and almost touches the ground by the time the bunch is ready for harvest. The naked portion of the floral axis also differs in the various varieties. In some, the 'wrists', i.e., the places of attachment of flowers on the axis, may be prominent as in *Chenkadali*, *Chakkarakeli*, etc., or inconspicuous as in *Pey kunnan*, *Kunnan* and *Boothi bale.*

In the second type the whole inflorescence bears pistillate flowers and hence all the flowers develop into fruits (Plate I, Fig. 4). To this group belong *Thattilla kunnan*, *Ayiranka rasthali* and *Moongil.* But in *Ayiranka rasthali*, if the plants do not have optimum requirements for growth, a small or large gap is formed between the bottom and the topmost pistillate flowers by the formation of deciduous staminate flowers in this region (Plate I, Fig. 5). Very rarely, reversion of this variety to its ancestor *Rasthali* occurs by the presence of pistillate flowers at the bottom region only with deciduous staminate flowers at the top as described in group (1).

In the third type the bottom region bears pistillate flowers, which develop into fruits, and is followed by persistent male flowers which consist of green rudimentary ovaries with the withered perianth and bracts often persisting. *Vamanakeli*, *Nendran*, *Kullan*, etc., exhibit this character (Plate I, Fig. 6). The rudimentary ovaries of these persistent staminate flowers do not grow large but remain green and turn yellow when the fruits ripen. In another type, however, the bottom region of pistillate flowers is followed by a region of deciduous male flowers which is followed by persistent withered bracts and staminate flowers as in group (3). Giant Governor of Trinidad is an example of this type (Plate I, Fig. 7). In these varieties the withered bracts are persistent to some extent. Some authors consider these flowers as neuter but it will be appropriate to term them as *persistent male flowers*, since the stamens are well developed in these as in the deciduous staminate flowers.

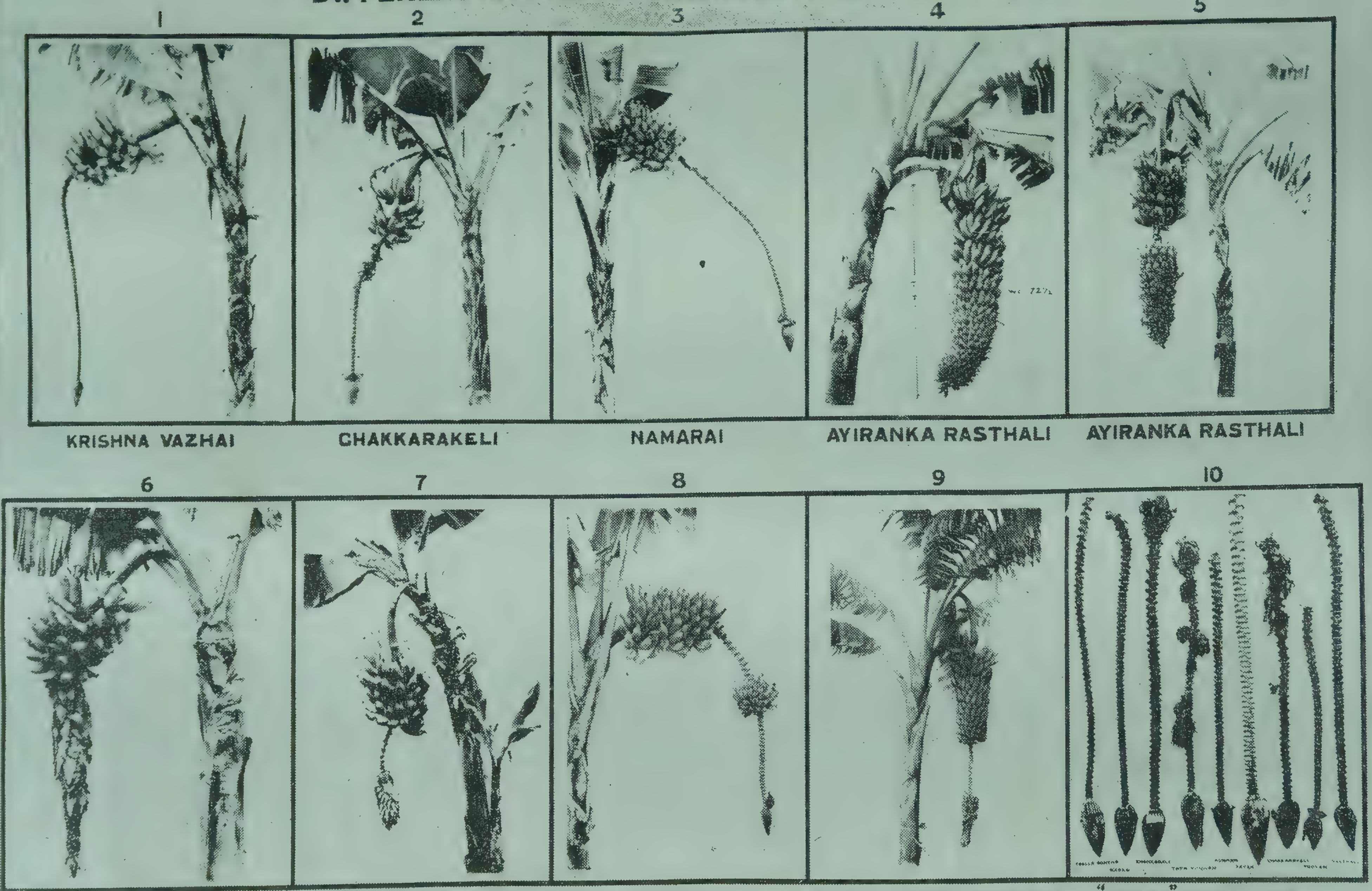
In the fourth type the bottom region bears pistillate flowers which develop into fruits followed by persistent male flowers in 2 to 15 fascicles as in group (3) which is again followed by deciduous male flowers. The bracts of persistent male flowers are, however, deciduous. *Chakkarakeli*, *Chenkadali*, *Rasthali* and other varieties are examples for this class (Plate I, Fig. 2). In some varieties, especially in the bunches of the second and subsequent generations through suckers, a second or even a third groups of pistillate flowers develop into fruits after the basal pistillate flowers have formed into fruits. The distances between these groups of fruits may be two to several inches. This occurs commonly in the varieties *Kunnan*, *Boothi bale*, *Venneettu kunnan*, *Poovan*, *Rasthali* and *Chenkadali* (Plate I, Fig. 8). Three fruit-bearing groups have been recorded in the variety *Boothi bale*.

In some varieties, especially those originated by sports, a few scattered ovaries of persistent male flowers are found on the naked portion of the floral axis above the fruit-bearing pistillate flowers as in *Thaen kunnan* and *Batheesas*. Sometimes a few scattered hands of normal fruits are produced on the axis above the pistillate flowers or the axis may even end in a region of fruits as in varieties like *Nalla bontha bathees*, *Booditha montha bathees* and *Pacha montha bathees* (Plate I, Fig. 9).

The above four types of variations in the inflorescence are common characteristics of the varieties exampled under each. These variations in the inflorescence have been taken by Linnaeus as specific characters. But from a study of a large number of

PLATE 1

DIFFERENT TYPES OF BANANA INFLORESCENCE



1 KRISHNA VAZHAI

2 CHAKKARAKELI

3 NAMARAI

4 AYIRANKA RASTHALI

5 AYIRANKA RASTHALI

6 KULLAN

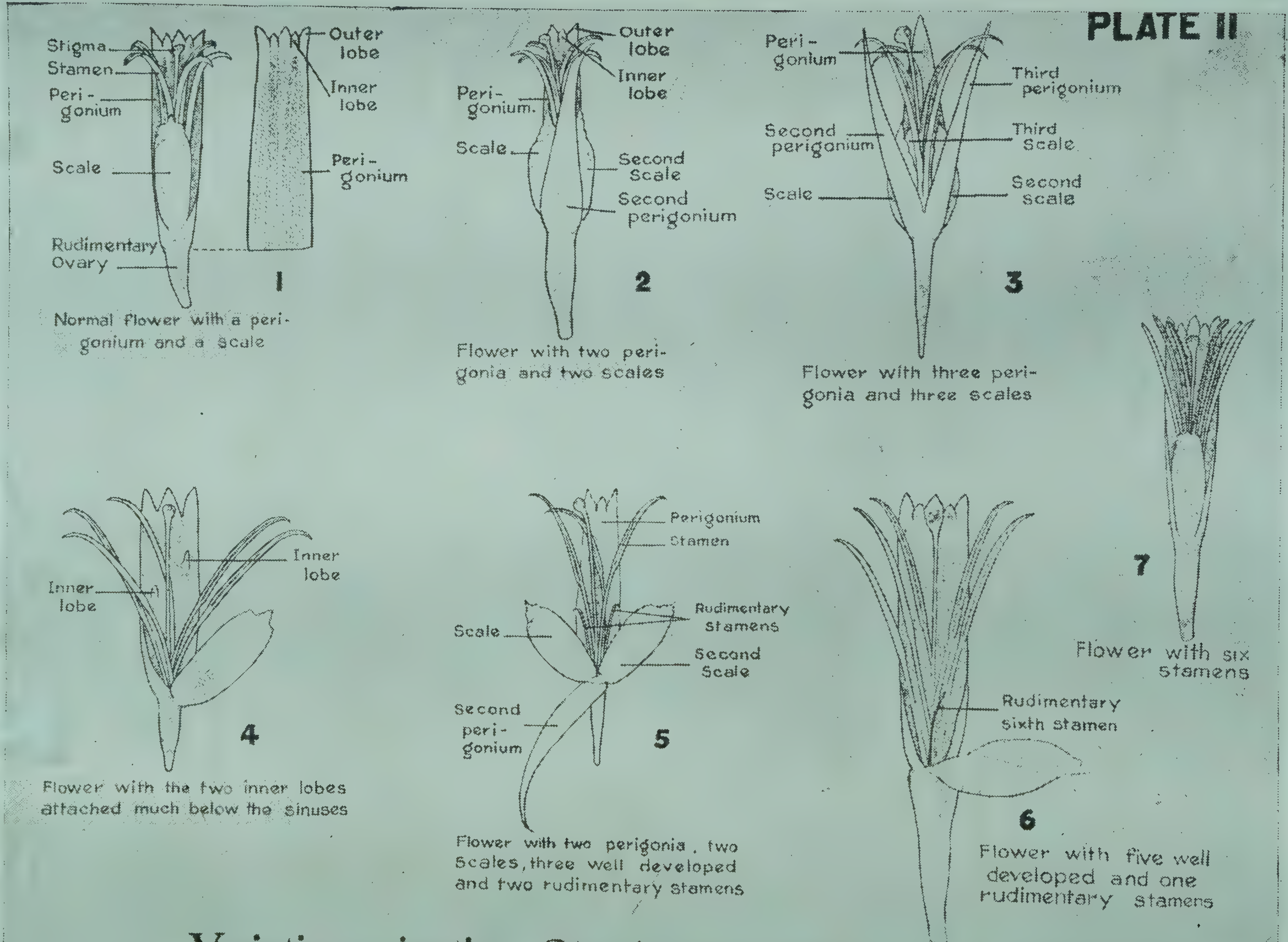
7 GIANT GOVERNOR

8 KUNNAN

9 PACHA MONTHA BATHEES

10 "HEART" WITH AXIS

PLATE II


Stigma
Stamen
Peri-gonium
Scale
Rudimentary Ovary
Outer lobe
Inner lobe
Peri-gonium
1
Peri-gonium.
Scale
Outer lobe
Inner lobe
Second Scale
Second perigonium
2
Peri-gonium
Second perigonium
Scale
Third perigonium
Third Scale
Second scale
3
Inner lobe
Inner lobe
4
Perigonium
Stamen
Scale
Rudimentary stamens
Second Scale
Second peri-gonium
5
Rudimentary sixth stamen
6
7

1 Normal flower with a perigonium and a scale

2 Flower with two perigonia and two scales

3 Flower with three perigonia and three scales

4 Flower with the two inner lobes attached much below the sinuses

5 Flower with two perigonia, two scales, three well developed and two rudimentary stamens

6 Flower with five well developed and one rudimentary stamens

7 Flower with six stamens

Variations in the Staminate Flowers of Musa varieties it has been found that two or more of these different types of inflorescences are often found in varieties which come under the same group. Hence these are not specific characters.

The flowers of Musa are trimerous but all parts are not fully developed ; some are reduced or wanting, while others are variously united. These variations in the staminate flowers were noticed while examining individual flowers of the various varieties and these are recorded here.

Outer perianth.—The outer perianth, generally termed perigonium is petaloid, prominently two keeled, especially in the anterior rows of the fascicles (hands), slit down the inner side to the base, rarely free and generally with five lobes. The outer three lobes constitute the three sepals and the inner two represent two of the petals (Plate II, Fig. 1). Occasionally there will be only two outer lobes to the perigonium, when there will be a second perigonium without any lobe as sometimes found in *Ney poovan*, *Pacha naadan*, *Adakka kunnan* and *Venneettu kunnan* (Plate II, Fig. 2). Sometimes all the lobes will be absent when there will be three perigonia as very rarely seen in the variety *Nendran* (Plate II, Fig. 3). The colour of the perigonium is purplish in most of the varieties but the lobes are yellowish.

Inner perianth.—The semi-transparent and boat-shaped structure opposite to the perigonium, termed scale and the two inner lobes of the perigonium constitute the inner perianth (corolla). The scale is half as long as the perigonium or slightly longer, but not as long, as described in some floras. The two inner lobes of the perigonium are attached slightly below the sinuses of the three outer lobes of the perigonium (Plate II, Fig. 1). Sometimes there will be only one lobe at the sinus when there will be two scales as sometimes found in *Ney poovan*, *Ney mannan*, *Venneettu kunnan* and other varieties (Plate II, Fig. 5). Whenever two scales are found, two perigonia also occur. Sometimes one or both the inner lobes will be attached very much below the sinuses on the inner surface of the perigonium as in *Venneettu kunnan*, *Chakkarakeli* and other varieties (Plate II, Fig. 4). The colour of the scale is generally whitish and semi-transparent except the apex which is yellowish. There are one to three ridges near the apex of the scale and in some varieties another one on the apex also.

Stamens.—Stamens are borne on rudimentary ovaries and are twice the number of sepals or petals ; but only five are generally developed. Six stamens are very rarely present in the variety *Nendran* (Plate II, Fig. 7), but the sixth stamen is more often rudimentary in this and other varieties like *Myndoli* and *Kaio*. Six stamens are present in the Abyssinian banana, *Musa ensete.* Rarely in some varieties like *Venneettu kunnan* there may be only three stamens with two rudimentary ones, or four with one rudimentary stamen (Plate II, Figs. 5 and 6).

The colour is usually whitish but in *Kaali* group of varieties the stamens are poorly developed and the anthers are dark in colour and irregularly bent. Fertile pollen is absent in most of the commonly cultivated bananas but present in the non-edible varieties.

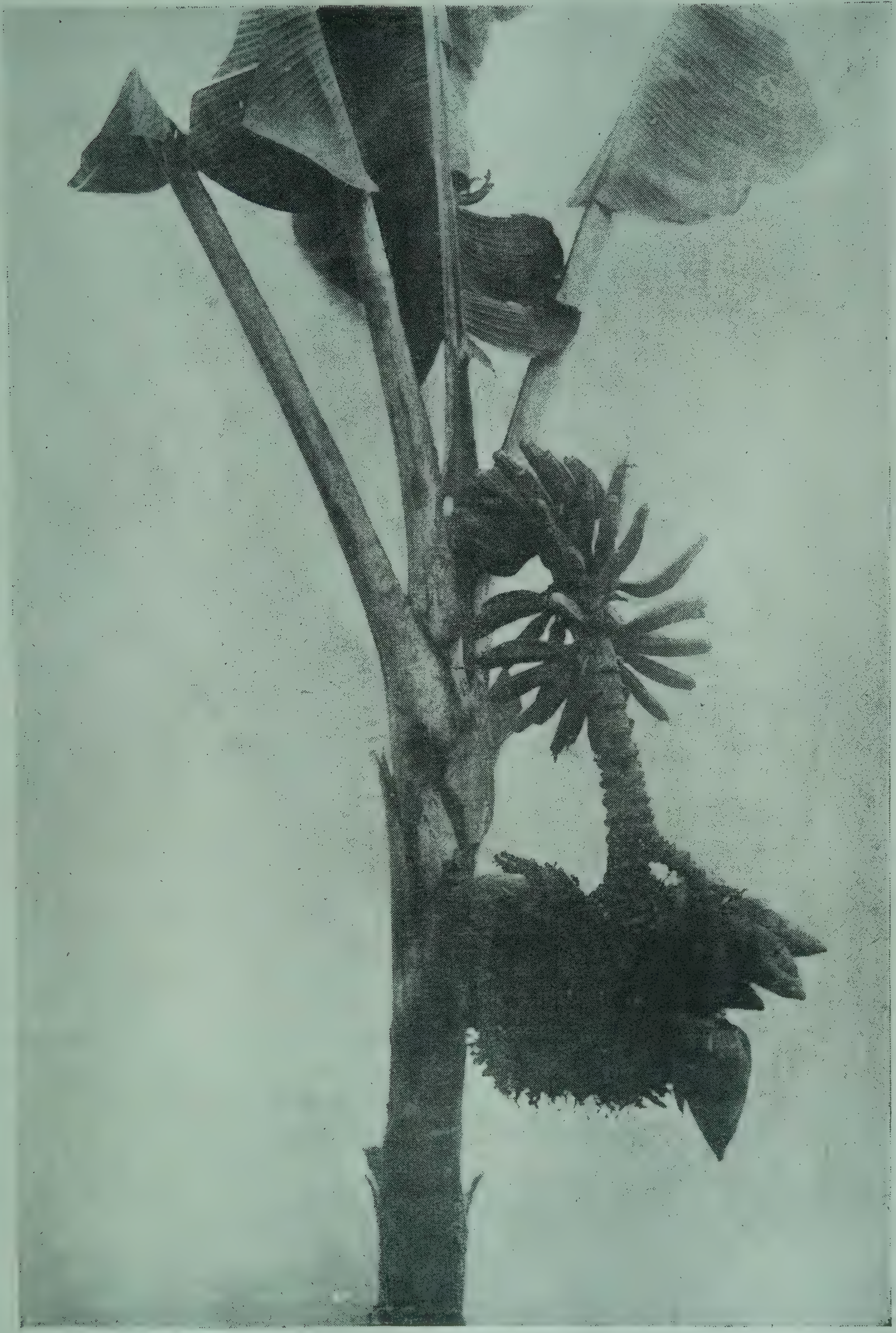
Pistil.—Style is stiff, erect, terete, whitish and often shorter than stamens. Generally the style in the pistillate flower dries up and falls off when the fruits begin to mature. But in varieties like *Kadali*, *Surya kadali* and *Chakkarakeli* the basal portion of the style is accrescent even to a length of one inch and remains green till the fruits ripen. Stigma in the staminate flower is club shaped, irregularly 5-6 lobed, yellowish in colour and sticky. Ovary of the pistillode is inferior, generally greenish white, 3-celled and of five sides of unequal width or terete. The ovaries of the pistillate flowers are very large and those of the persistent male flowers are intermediate in size, while those of the deciduous staminate flowers are small. The ovary of the pistillate flowers diminishes gradually in size from bottom upwards, the first developed being the biggest. All the varieties that are cultivated for fruits are sterile. Generally wild and seeded varieties are fertile. The fruits of fertile varieties are full of seeds and therefore, unfit for human consumption. Monkeys and birds, however, eat the pulp when ripe. *Ela vazhai*, often grown in the backyards of Indian houses for its leaves to be used as plates, is a fertile variety.

Bananas are generally parthenocarpic, but varieties like *Pey kunnan*, *Vannan*, *Anaikomban*, *Poovan* and *Kostha bontha* are readily cross-pollinated in nature when grown in the vicinity of fertile species and produce well-developed seeds. This seed production adversely affects the quality of fruits. Fertile species should not, therefore, be planted in the vicinity of banana plantations. The banana seeds have very low viability and this character of the seed is a great handicap to banana breeders.

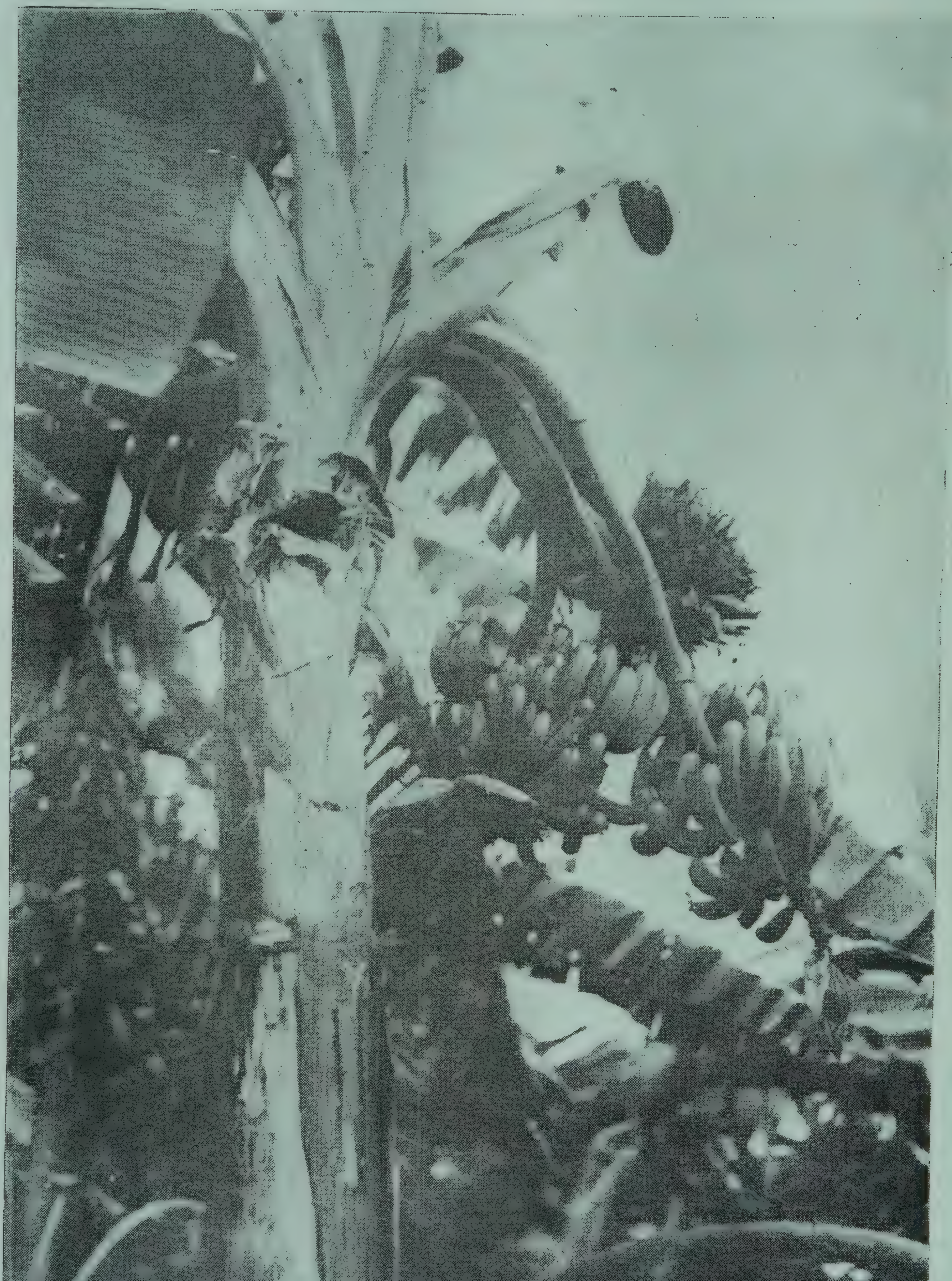
ABNORMALITIES IN INFLORESCENCE

A plant of *Musa textilis Nee* was noticed by the author at Veerarajendrapet in Coorg with a panicled inflorescence having six different spikes of varying length. The flowers, however, did not develop into fruits.

In the variety *Kaali* (" *Mara bale* "), the rachis above the region of the fruits fasciated and produced a dozen ' hearts ' (cone-like



5. FASCIATED INFLORESCENCE IN A BANANA



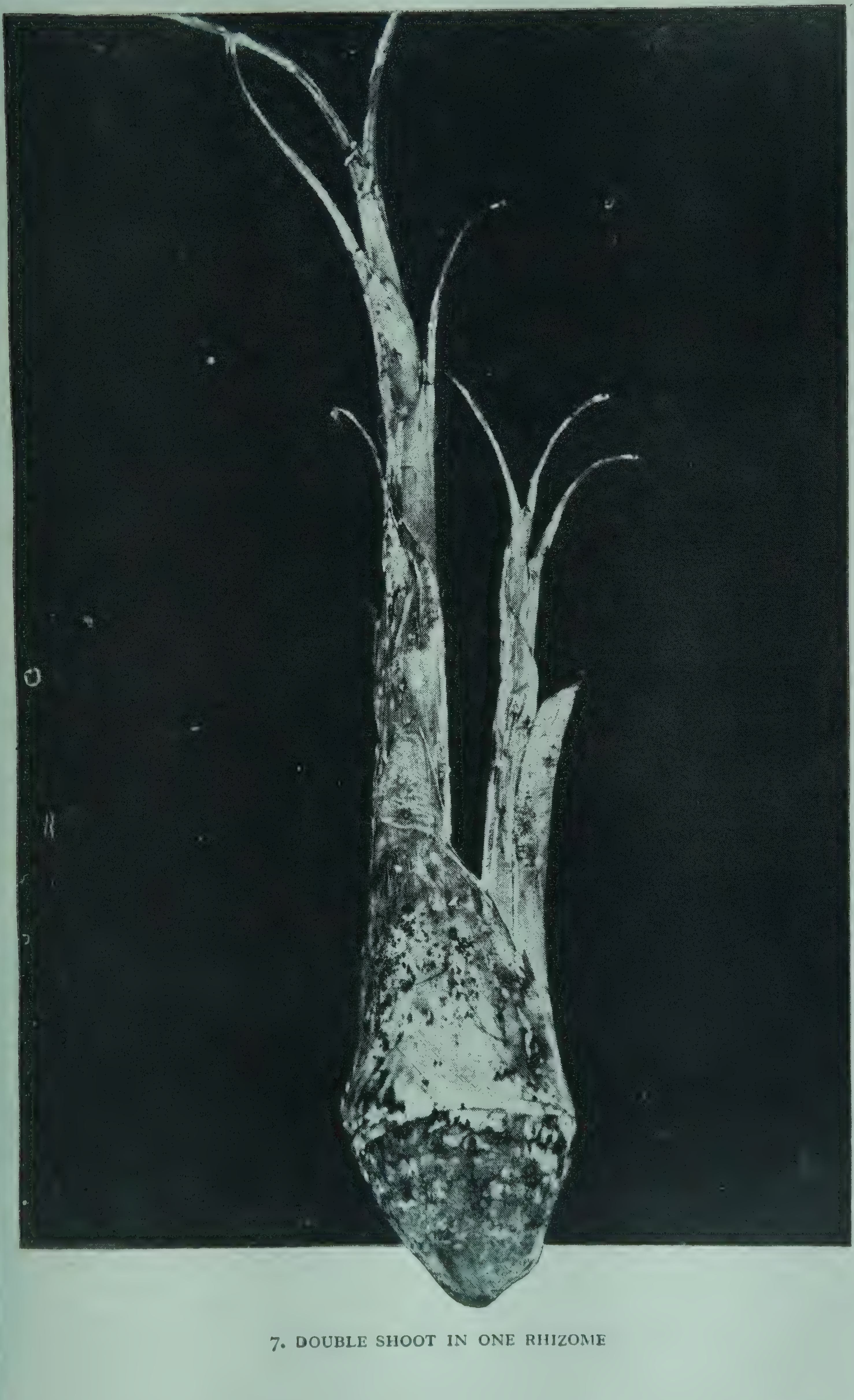
6. MULTIPLE BUNCHES IN A BANANA PLANT

inflorescence) of pistillate flowers, all developing into diminutive fruits ; while the original statimate ' heart ' remained as such. This was also noted by the author at Veerarajendrapet, Coorg (37).

In the variety *Monthan*, four independent flower buds, instead of the normal one, were produced by the rhizome, which is the real stem of the plant. They forced their way out at the crown of the plant in the usual manner through the centre of the pseudostem. All of them bunched normally ; but one inflorescence forked and gave rise to two bunches so that in all 5 normal bunches were simultaneously produced by a single plant. The bunches as well as the fruits were of moderate size. This was noticed by Mr. T. A. Davis, B.A., a research student in Botany, Agricultural Research Institute, Coimbatore, at Culachal in South Travancore and the photo of the plant was loaned by him.

ABNORMALITIES IN SHOOT

A double shoot in a common rhizome was noticed by the author in the variety *Kapur* at Coimbatore. The shoots were normal and healthy and would have given rise to two plants if the rhizome had been planted.



7. DOUBLE SHOOT IN ONE RHIZOME

CHAPTER IV

ORIGIN OF BANANA VARIETIES

For the classification of the cultivated crops into species the morphological characters represent only the first approach to the subject. The agronomist is more interested in biological and physiological characters, such as their behaviour with respect to drought, cold, etc. Without doubt natural selection is a very important, perhaps the all-important feature of species differentiation.

The chromosome-mutation is often associated with very striking structural differentiation, and it furnishes an indisputable example of species-formation without the instrumentality of selection.

Sports and ecological types play an important part in the evolution of varieties. As will be described later, due to climatic, physiological or soil changes the characteristics like odour, disposition of the peduncle and similar features which would constitute important characters for classification of wild plants are of no importance in cultivated crops since odour disappears when the plant is grown in a different place of even the same physical features and a pendulous peduncle assumes a semi-erect disposition under almost the same soil conditions. In the evolution of banana varieties the *Kaali* group with the anthers poorly developed, curved or irregularly bent and dark in colour appears to be the earliest to be brought under cultivation as it is even to this day seen in a semi-cultivated state in the Wynaad and Coorg on the West Coast of the Madras province.

SPORTS OF BANANA

Sports are a common occurrence in banana and according to some authors, the cultivated banana has originated as gene mutation. All such sports have different local names in various places where they are grown. In most cases the taste and flavour of the fruits of the sport and its mother plant may be nearly the same though there may be marked differences in the colour of stem, colour of unripe and ripe fruits, arrangement of hands (fascicles of fruits on the rachis), absence of persistent or deciduous staminate flowers or both, size of bunches and of individual fruits, absence or presence of apex in fruits and in other characteristics. A common sport met with in this country has originated from the red banana of commerce (Red Jamaica banana) and is the green sport called *Venkadali* (Green red, White claret). Green fruits of *Venkadali* ripen yellow while the purple fruit of the mother plants ripens red.

Taste and flavour of the pulp are same in both. The author has seen a green sport in a stool of red banana. The rhizome of the green sport was traced and found attached to that of the red banana. The suckers of the green produce only green plants with green fruits and have not been known to revert to red.

Ayiranka rasthali is a sport of *Rasthali.* There are only pistillate flowers in the normal inflorescence, all of them developing into fruits. But in the absence of optimum cultural conditions, a small or a large gap is produced between the basal and the terminal regions of the pistillate inflorescence by the development of deciduous staminate flowers in this region (Plate III, Fig. 1). The author has seen this sport reverted to the mother plant, *Rasthali* in two instances.

Thattilla kunnan, a sport of *Thaen kunnan*, is another example of the type normally having all pistillate flowers developing into fruits (Plate III, Fig. 2). Occasionally a few hands of deciduous male flowers are developed above the pistillate flowers which when they drop off leave a short length of the naked axis above the fruits. The author has seen two plants of this type reverted to the mother plant, *Thaen kunnan.*

Moongil is a sport of *Nendran* and is the *Pisang tando* of Malaya. The pistillate flowers in this sport are confined generally to one 'hand'. The fruits are larger than those of the mother plant, *Nendran* (Plate III, Fig. 3).

Motta poovan is a sport of *Poovan.* The fruit of *Poovan* has a distinct apex and it is totally absent in the sport. It has been noticed only in one locality in South India and appears to be of recent origin. It has not been seen reverted to the mother plant (Plate III, Fig. 4).

Bathees (*Pacha montha bathees, Booditha montha bathees* and *Nalla bontha bathees*). About a dozen varieties of bananas are grown especially in South India for culinary purposes. Most of them belong to the *Monthan* group. Four varieties, viz., *Monthan, Sambrani monthan, Nalla bontha* and *Thella bontha* of this group have on an average 40 to 50 fruits of 3/4 to one foot long and each fruit weighing 1/2 to one lb. and the hands and fruits are held in a lax manner on the rachis. The *Bathees* with conjested hands and fruits on the bunches in 3 out of the 4 varieties of *Monthan* group referred to above, have been collected and are grown at Coimbatore. In these, there are over 20 hands of fruits held in a conjested manner on the rachis, each fruit only 4 to 7 inches long and weighing only 1/6 to 1/4 lb. These *Bathees* do not normally revert to their mother plants, but when introduced to a new locality with different soil and climatic

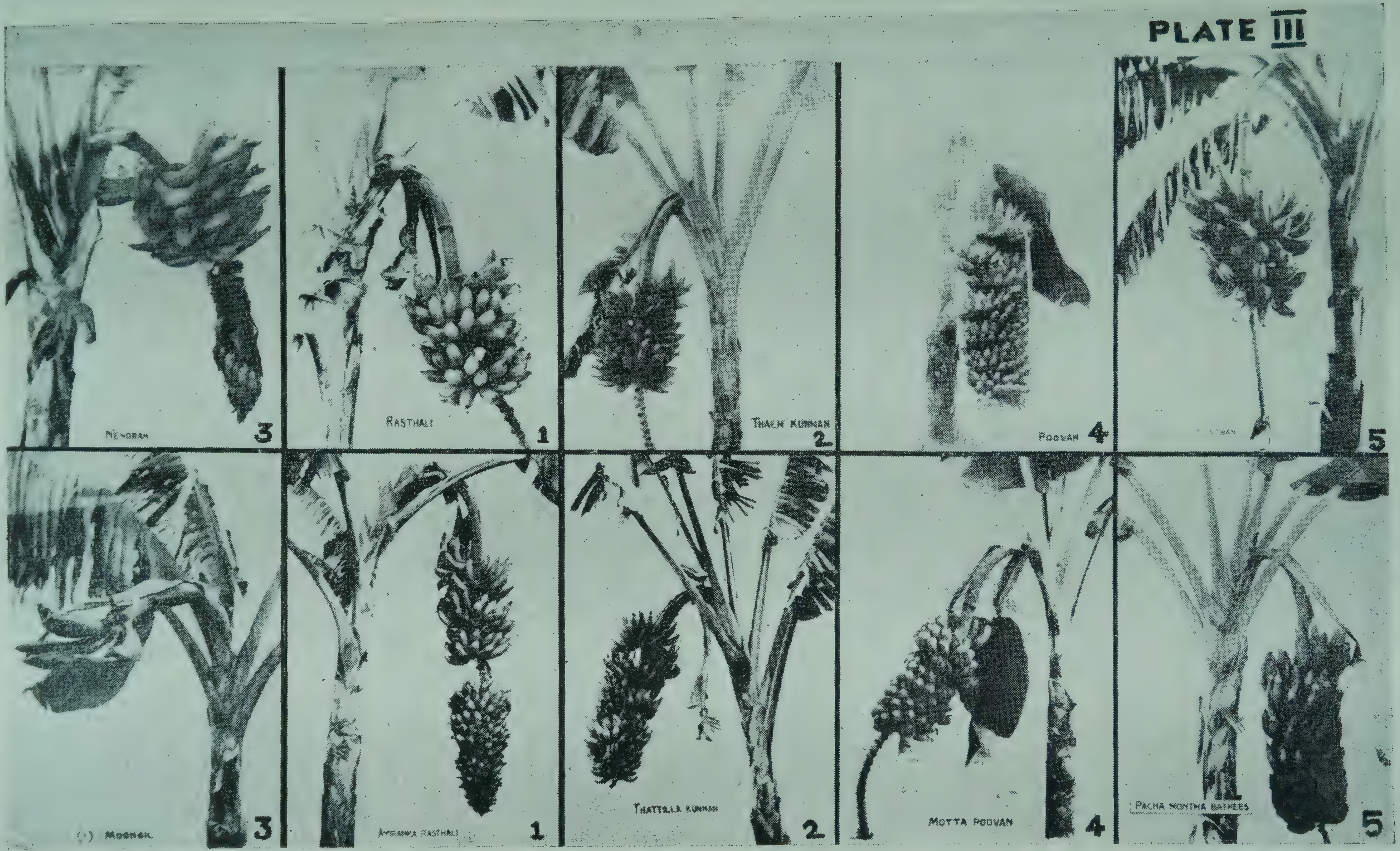


PLATE III
NENDRAN
3
RASTHALI
1
THAEN KUNNAN
2
POOVAN
4
5
3
1
THATTILLA KUNNAN
2
MOTTA POOVAN
4
PACHA MONTHA BATHEES
5

8. COMMON SPORTS AND THEIR MOTHER PLANTS

conditions they sometimes revert to the mother plants (Plate III, Fig. 5). These reversions took place at Coimbatore in the plants introduced from Vizagapatam. Besides these sports with fixed characters, there are others like *Ayiranka kunnan* and conjested type of *Rasthali*, the suckers of which do not breed true but produce only normal bunches like those of the mother plants. The *Ayiranka kunnan* and the conjested type of *Rasthali* have very many small fruits held on the rachis in a conjested manner.

Sports are also found in the Gros Michel variety similar to the sports found in the Indian banana varieties. Six forms have been noticed and named, Pink Jamaica, Glengoffe, Weeping Jamaica, Plantain Jamaica, High Gate and Free Hill.

ECOLOGICAL TYPES

Unlike other plants, the banana varies a good deal as regards size, disposition of inflorescence, arrangement of fruits on the rachis, colour of ripe fruits, taste, flavour, odour, consistency of the pulp, keeping quality of the fruits and other characters due to variations in climate and physical features.

Sirumalai, an ecotype of *Vannan*, is a well-known South Indian banana of commercial importance grown in the Sirumalai Hills of the Madurai district between elevations of 2,500 to 3,000 feet under rain-fed condition. It is largely exported to Madras City where there is a demand for this banana. The colour of the ripe fruits is yellow with a greenish tinge. Fruits do not easily drop off from the pedicels and they have good taste, flavour and keeping quality. The pulp is slightly juicy.

Virupakshi is another ecotype of *Vannan*. This is another well-known South Indian banana of commercial importance grown in the Pulney and other hills of the Madurai district between 4,000 to 5,000 feet under rainfed condition. The colour of the ripe fruit is greenish yellow: ove ripe ones turning dark. Fruits do not easily drop off from the pedicels and they have good taste, flavour and keeping quality. The pulp is rather dry. The fruits are used for making '*Panchamirtham*'. This confection keeps even for an year in good condition due to the dry nature of the pulp of this banana. If *Sirumalai* fruits are used for this purpose, the '*Panchamirtham*' gets spoiled in a very short time due to the juicy nature of the pulp of this variety.

Vannan.—Though this variety is similar to the above two varieties, it has no commercial value. The fruits drop off easily from the pedicel. It is grown both under rainfed and irrigated conditions. The colour of the ripe fruit is yellow and the pulp has fairly good taste and flavour. The ripe fruits have poor keeping quality. The pulp is juicy and slightly acid in taste. When this and the abovementioned *Sirumalai* and *Virupakshi* varieties were grown for four generations at Coimbatore at an elevation of 1,400 feet under irrigated condition, it was not possible to make out one type from the other, the first two having changed to the third one. The first two are, therefore, ecotypes of the variety *Vannan.*

Chakkarakeli is supposed to be the best of all the banana varieties. Fruits are held strongly to the pedicel. The ripe fruits have poor keeping quality.

'*Raja vazhai*' is an ecotype of *Chakkarakeli.* The bunches of fruits in this appear to be hanging on the tree as if the peduncles are damaged at the bent portion. In other respects there is no difference. It is grown in the Tiruchirappalli and adjacent districts.

'*Raja bale*' is another ecotype of *Chakkarakeli* grown in Bangalore. Some plants bear the normal bunches of *Chakkarakeli* while others have more hands closely set on the rachis. There is no difference in other respects.

'*Raja bale of Virajpet*' is another ecotype of *Chakkarakeli.* It is grown at Virajpet and other places in Coorg. The colour of unripe fruits in *Chakkarakeli* is whitish green which turns golden yellow when ripe ; but in this type the colour of the unripe fruit is green which does not turn yellow on ripening. The elevation of Coorg is about 4,000 feet and the green colour of the ripe fruit might be due to the cold climate of this place. When all the above mentioned ecotypes of *Chakkarakeli* were grown at Coimbatore all of them produced normal *Chakkarakeli* bunches proving thereby that all the three are ecotypes of *Chakkarakeli.*

Poovan is the commonest commercial variety grown in South India.

'*Dorai vazhai*' of Kallar, Nilgiris, is an ecotype of *Poovan.* It is grown in the southern slopes of the Nilgiris under rain-fed condition. The soil here is not rich as the lands are subject to erosion. The fruit of this variety though small in size is very sweet. When this was grown at Coimbatore it proved to be *Poovan* in all respects.

Krishna vazhai is the '*Kari vazhai*' of Sirumalai and Pulney Hills of the Madurai district. It has blueblack stem in its natural habitat but when grown at Coimbatore for four or five generations under irrigation the blue-black colour changes to dark or grey spots and the intensity of these spots varies according to the shade these plants are subjected to. The plant with the blue-black stem is an ecotype of the spotted one.

VARIATIONS DUE TO CULTURAL PRACTICES

Besides the variations due to sports and ecotypes, the banana responds to a great deal to the cultural treatment given to it.

Rasthali is one of the favourite varieties wherever it is grown. The fruits of this variety grown in the laterite soils of the West Coast of the Madras province under rain-fed conditions have good taste and flavour without any lumpy formation in the pulp of the ripe fruit.

The same variety when grown at Erode and Tiruchirappalli, cultivated in an intensive manner, under irrigation, produces bunches and fruits of very large size often with lumpy formation in the pulp of the ripe fruits. These fruits have poor taste, flavour and keeping quality. The colour of the rind of the ripe fruit is pale yellow unlike the red-spotted yellow rind of the fruits produced in other places under rainfed condition.

'*Nanjangud rasa bale*' of Mysore State is a type of *Rasthali* grown at Nanjangud in the Mysore State. The fruits are very small in size but are very sweet with good flavour. Though the crop is irrigated, it is grown in as natural a condition as possible without paying much attention. These small fruits fetch in the Bangalore and Mysore markets higher prices than the very large fruits of the same variety grown elsewhere. Most varieties develop the best taste and flavour when grown under natural conditions, i.e., without any special effort.

'*Pulippukai of Pollachi*' of Coimbatore district grown at Erode and Tiruchirappalli is *Poovan* cultivated in an intensive manner under irrigation. The fruits produced are very large in size but are sour to that extent that it goes by the name '*Pulippukai*', meaning sour fruits. Further details of variation due to cultivation are given under ' Forcing of banana ' elsewhere in this book.

CHROMOSOME NUMBES

Cytological investigation, i.e., the number of chromosomes and their constitution in a polyploid species like banana is expected to throw light and explain the highly elastic nature of characters, thereby helping classification.

Cheesman and his colleagues have been engaged in the study of chromosomes of banana in Trinidad. Suckers of important South Indian banana varieties were forwarded to him through Kew in connection with the study.

The polyploid chromosomal condition is characteristic of banana. Chromosome number in Musa is $2n = 22$, the basic or haploid number of the genus being 11. The edible forms having 33 chromosomes must have arisen from the original diploid plants having $2n = 22$.

The cytological findings confirm the conclusion drawn by Humphrey that *Musaceae* are a heterogeneous group. The findings further emphasise the heterogeneity not only in the family *Musaceae* but within the genus *Musa* itself.

The chromosome numbers in some of the Madras banana varieties are given hereunder :—

Vamanakeli group (Cavendish)	
Vamanakeli (Canary Islands banana)	$2n = 33$
Giant Governor (Sport of *Vamanakeli*)	$2n = 33$
Nendran group (Plantain)	
Nendran (Plantain of Westerners)	$2n = 33$
Moongil (sport of *Nendran*)	$2n = 33$
Kadali group	
Gros Michel (Trinidad)	$2n = 33$
Chenkadali (Red banana)	$2n = 33$
Venkadali (Green red, White claret)	$2n = 33$
Rasthali (Lace)	$2n = 33$
Poovan (Fill basket)	$2n = 33$
Peyan group	
Pey kunnan (Awak Lagor)	$2n = 33$
Monthan group	
Monthan (culinary variety)	$2n = 33$
Seeded banana group	
Ela vazhai (*Musa balbisiana* Colla.)	$2n = 22$
Kattu vazha (*M. kattuvazhana* K. C. Jacob sp. nov.)	$2n = 22$
Naaru vazha (*M. textilis* Nee ; Manila)	$2n = 20$

The last one may be an aneuploid form.

This shows that the various varieties and forms of edible banana have all got $2n = 33$.

This confirms the author's finding that all edible Musa belong to one and the same species.

The seeded bananas, have, however, less number of chromosomes than the cultivated bananas.

CHAPTER V

NAMES OF THE VARIETIES

Most of the varieties of banana are known by different local names. The cultivators are aware of even the small variations in these varieties and have given them different names. A survey of the bananas of the Madras province has enabled the recording of not less than 500 local varieties. Each local language has its own general name for the banana, as Tamil—*vazhai*, Telugu—*Arati*, Kanarese—*Bale* and Malayalam—*Vazha* ; and the varieties have their own local names as Tamil—*Rasthali*, *Monthan*, *Poovan* and other names. A particular local name at times stands for different varieties in different localities especially if they are scattered ; and also the same variety is known under different names. Sometimes newly introduced varieties take the names of the places wherefrom they have been brought. *Poovan*, the common variety of the Madras province is a plant of comparatively recent introduction. It is known at Mysore, Bangalore and places nearby as "*Bengala*" suggesting its introduction from Bengal. It is known at Mangalore, Tellicherry and their neighbourhood as "*Mysore*" or "*Mysore poovan*" suggesting its introduction from Mysore. Similarly, the same *Poovan* is called at Quilon and Trichur as "*Palayangodan*", at Coimbatore "*Erode poovan*", and at Hospet "*Salem*". The local names sometimes indicate the characteristics of the plant or of the fruit. *Vamanakeli*, the name of a particular variety, denotes the short stature of the plant, after *Vamana*, the short statured deity of the Hindu mythology. *Pedda pachcha arati* indicates that it is a large form of "*Pachcha arati*". The term "Pachcha" meaning green refers to the green colour of the ripe fruit. Kullan means a short man. This name is given in Tamil areas to another dwarf variety. "*Pulippu kai*" for Poovan at Pollachi in the Coimbatore district, is after the sour taste of the ripe fruit.

Suckers of the various local varieties were brought to Coimbatore and grown in the Estate attached to the Agricultural Research Institute for a number of years. As a result of the critical study made for over a decade, these were classified into 53 varieties, 15 sub-varieties 5 ecotypes and one unstable type, and appropriate common names mostly selected out of the local names were allotted to them. There were some varieties without any local names and to these new common names were given. These constitute the standardised common names of the Madras banana varieties. They are enumerated in Appendix I ; their local names are also mentioned therein for purposes of easy reference. Some of the localities where these varieties are largely grown are also mentioned.

Some of the Madras banana varieties are found outside the Madras province, and in such cases, the foreign names also of those varieties are given in the Madras list.

An index for the local and common names is included in order to facilitate reference and this is in Appendix II. These 74 varieties of Madras bananas can be reduced into nine groups, viz., (1) *Vamanakeli*, (2) *Nendran*, (3) *Kadali*, (4) *Kaali*, (5) *Kunnan*, (6) *Peyan*, (7) *Mannan*, (8) *Monthan* and (9) Seeded bananas. The unripe fruits of the groups 7 and 8 are mainly used for making curries consumed with rice. In some places, the ripe fruits of *Monthan* group are also popular and are eaten like the other fruits.

First group—Vamanakeli.—In this group the fruits are rather slender, from 6 to 8 inches in length, curved and cylindrical. They have more or less green rind when ripe and the pulp is very soft when flecked (i.e., fully ripe). The Canary Islands banana, so called because it is largely grown in that island and which goes in other countries by the name of Cavendish, Chinese or the Governor comes under this category.

Second group—Nendran.—The fruits of this group with its various forms have tough pulp even when fully ripe and are usually eaten after steaming. They are large, sometimes nearly a foot long and 1¼ to 1½ inches in diameter. It is popularly known as "banana" on the Malabar Coast while all the other varieties of banana are known as 'plantain' throughout India. It is called plantain in Europe, America, Africa, Australia and other countries. Some varieties in this group do not have all the characteristics mentioned here.

Third group—Kadali.—One peculiar feature of this group unlike in most other varieties, is that the male flowers in 1 to 16 "hands" just above the fruits are persistent, the remaining male flowers being deciduous. Another feature of the group is that the peduncle and rachis do not droop down but remains spreading, sometimes nearly at right angles to the stem.

Fourth group—Kaali.—The fruits of this variety have five unequal sides, except those at both ends of the "hand," i.e., the fruits at the fartherst ends of each cluster, which have three orsometimes four sides only. The rind is very thick. The anthers of the flower are poorly developed and dark in colour. The fruits are from 5 to 7 inches in length and one to 1½ inches in diameter. The channel of the petiole is wide open and its margins are far apart. The fibre of the leaf sheath is stronger than that of other edible banana varieties. *Virupakshi*, *Pachcha nadan* and the *Apple* of the Hawaii Islands belong to this category.

Fifth group—Kunnan.—The plants of this group are rather small with the leaves more or less erect and narrower than in the other varieties. The fruits are small in size varying from 3 to 5 inches in length and ¾ to 1 inch in diameter. The pulp is comparatively less subacid than in other varieties. The unripe fruits are suitable for making flour. *Adakka kunnan*, the flour of which is popular on the Malabar Coast as food for children, belongs to this group.

Sixth group—Peyan.—The plants of this group are the tallest and stoutest in a plantation. The channel of the petiole is closed and its margins overlap or touch each other. The fruits are of medium size varying from 5 to 6 inches in length and ¾ to 1 inch in diameter. *Peyan* and *Pey kunnan* belong to this group.

Seventh group—Mannan.—The bases of the lamina or leaf blade, on both sides are deeply auricled. The fruits are from 6 to 7 inches in length and 1¼ to 1½ inches in diameter. The unripe fruits are largely used for making curries; occasionally they are also consumed as ripe fruits.

Eighth group—Monthan.—The margins of the petiole nearly touch each other. The fruits of most of the varieties in this group are large often of 9 to 11 inches in length and 1½ to 1¾ inches in diameter and weigh ½ to 1 lb. each. They are consumed mostly as green fruits in curries, though in some places the ripe ones also are eaten.

Ninth group—Seeded bananas.—There are three species in this group. "*Naaru vazhai*" or Manilla hemp (*Musa textilis* Nee) as it is commercially known was introduced into this country from Philippines. *Ela vazhai* (*Musa balbisiana* Colla.) is another species grown generally in the backyards of houses, and it is meant to provide plate leaves for serving food on. "*Kattu vazha*" (*Musa kattuvazhana* K. C. Jacob sp. nov.) is the only indigenous species of this group that grows wild in the Madras province in the evergreen forests of the Western Ghats.

There is also another seeded banana—*Musa superba* Roxb. which does not produce suckers, and it is found on the rocky hill sides of the Western Ghats. It is characterized by swollen bases; the propagation is only by seeds. It is often grown in gardens as an ornamental plant.

Standardised common names of the Madras Banana varieties and their interesting features

Vamanakeli group

1	*Vamanakeli*	A tasty fruit	
2	*Giant Governor* ...	A delicious fruit ; obtained from Trinidad	
3	*Pedda pachcha arati* ...	A delicious fruit ; rare	

Nendran group

	Nendran	Both for culinary purpose and as dessert fruit.	
	forma (1) *Kaalieththan*	Do.	
	(2) *Eleri* ...	Do.	
	(3) *Kaleththan*	Do.	Rare
	(4) *Veleththan*	Do.	Do.
	(5) *Myndoli*	Do.	
	var. *Moongil*	Do.	Very rare ; not economic
5	*Chingan*	A tasty fruit ; rare	
	forma *Maanniyilla chingan*	Do.	very rare
6	*Eththa chingan* ...	A delicious fruit ; rare	
7	*Chinali*	A tasty fruit ; rare	
8	*Kaio*	A culinary variety ; rare ; obtained from Honolulu	

Kadali group

9	*Kadali*	A very delicious fruit ; not economic	
10	*Surya kadali*	A very delicious fruit ; very rare ; not economic ; a Malayan banana	
11	*Matti*	A delicious fruit	
12	*Namarai*	A delicious fruit ; not economic	
13	*Aanai komban* ...	A tasty fruit	
14	*Karim kadali*	Both a tasty fruit and a culinary variety	
15	*Gros Michel*	A delicious fruit obtained from Trinidad	
16	*Chakkarakeli*	The most delicious banana	
17	*Nalla chakkarakeli* ...	A tasty fruit	
18	*Kari vazhai*	A very tasty fruit	
	ecotype *Manoranjitham*	Do.	with odour
19	*Chenkadali*	A delicious fruit	
	forma *Venkadali* ...	Do.	rare ; not economic
20	*Sanna chenkadali* ...	Not a tasty fruit ; not economic	
21	*Rasthali*	A very delicious fruit ; common	
	forma *Ayiranka rasthali*	Do.	rare
22	*Suganthi*	A tasty fruit	

23 *Ney poovan*	A delicious fruit ; common in Malabar
24 *Poovan*	A tasty fruit ; very common
forma *Motta poovan*	Do. ; very rare
25 *Thiruvananthapuram*	Do. ; do.

Kaali group

26 *Kullan*	A tasty fruit ; rare
27 *Nendra padaththi*	Do. ; do.
28 *Pachcha naadan*	Do. ; common
29 *Kaali*	Do.
30 *Vannan*	Do.
eco-type (1) *Virupakshi*	A very delicious fruit ; hill banana
(2) *Sirumalai*	Do. ; do.
31 *Kapur*	A delicious fruit
eco-type *Apple*	Do. ; very rare ; obtained from Honolulu
32 *Krishna vazhai*	A tasty fruit

Kunnan group

33 *Kunnan*	A tasty fruit
type *Ayiramkunnan.*	Do. ; very rare
34 *Venneettu kunnan*	Do. ; rare
35 *Adakka kunnan*	A fairly tasty fruit ; flour is fed to infants
36 *Thean kunnan*	A delicuous fruit ; rare
forma *Thattilla kunnan*	Do. ; do.

Peyan group

37 *Peyan*	A tasty fruit
38 *Pey ladan*	Not a tasty fruit
forma *Mayil vazhai*	Do. ; rare
39 *Boothi bale*	Do. ; cure for piles
40 *Kostha bontha*	A tasty fruit ; thrives in alkaline soils
41 *Pey kunnan*	Do. ; do.
42 *Enna benian*	Not a tasty fruit ; very rare

Mannan group

43 *Ney Mannan*	A tasty culinary variety ; not a tasty fruit ; common
44 *Venneettu mannan*	A tasty culinary variety ; not a tasty fruit ; rare

Monthan group

45 *Monthan*	A tasty culinary variety ; not a tasty fruit ; common
forma *Pachcha montha bathees.*	A tasty culinary variety ; not a tasty fruit; rare

46	*Sambrani monthan* ...	A tasty culinary variety; not a tasty fruit; rare
	forma *Booditha montha bathees*	Do. ; do. ; do.
47	*Nalla bontha*	A tasty culinary variety; not a tasty fruit; common
	forma *Nalla bontha bathees*	A tasty culinary variety; not a tasty fruit; very rare
48	*Thella bontha*	A tasty culinary variety; not a tasty fruit; rare
49	*Kuri bontha*	Do. ; do. ; do.
50	*Kallu monthan* ...	Do. do. ; Very rare; not economic
	Seeded banana group	
51	*Ela vazhai*	Grown for plate leaves
52	*Kaattu vazhai* ...	Wild; leaves used as plates
53	*Manila hemp* (*Musa textilis* Nee) ...	Very rare; not cultivated

ARTIFICIAL KEY TO THE VARIETIES OF BANANA

An artificial key has been prepared taking into consideration the various characteristics of the banana plant. This classification, however, is not a natural one and the plants in the natural group referred to above may come under different positions in the artificial key. Author's own observations on the various characteristics mainly of Madras bananas have formed the basis for the preparation of this key.

Artificial key to the varieties of Banana

- Heart absent—
  - Hands 1 or 2 in a bunch ... ... *Moongil*
  - Hands many—
    - Fruit with 5 unequal sides and apex ¾ to 1 inch long ... *Thattilla kunnan*
    - Fruit terete and apex less than ½ inch long ... *Ayiranka rasthali*
- Heart present—
  - Heart white ... ... *Eththa chingen*
  - Heart purple—
    - Withered bracts and staminate flowers persistent throughout—
      - Fruit 4 to 7 inches long, terete, apex absent—
        - Stem about 4 feet in height ... ... *Vamana keli*
        - Stem about 7 feet in height, apex of fruit ¾ to 1 inch long ... ... *Chingen*
      - Fruit with 5 unequal sides, anthers dark in colour—
        - Stem about 5 feet in height ... ... *Kullan*
        - Stem about 10 feet in height ... ... *Nendrapadaththi*

Heart present—*cont.*
Heart purple—*cont.*
Withered bracts and steminate flowers persistant throughout—*cont.*
Fruit 9 to 12 inches long, 4 to 6 hands laxily held on the bunch ... ... *Nendran*
Withered bracts and staminate flowers persistent intermittently—
Fruit 5 to 7 inches long, 5 ridged ... *Chinali*
Withered bracts and staminate flowers in the top half of the axis only—
Fruit 5 to 7 inches long, terete, apex absent. *Giant Governor*
Heart and the naked part of axis nearly horizontal to stem—
Rind of fruit papery thin—
Leaf yellowish green and shining ... *Surya kadali*
Leaf green ... ... *Kadali*
Rind of fruit medium thick ... ... *Namarai*
Heart and axis nearly horizontal to stem for about a foot in length and then drooping—
Bunches of fruit resting on the stem—
Fruit 5-ribbed, blunt ... ... *Kaio*
Fruit teret, apex $\frac{1}{2}$ inch ... ... *Suganthi*
Bunches of fruit not resting on stem—
Rudimentary ovaries of the persistent staminate flowers persist in about 10 hands—
Fruit purple—
Apex of fruit blunt ... ... *Chenkadali*
Apex $\frac{3}{4}$ inch long ... ... *Sanna chenkadali*
Fruit green—
Apex blunt ... ... *Venkadali*
Apex $\frac{1}{4}$ inch long, margins of petiole and part of leaf-sheath red ... *Rasthali*
Apex $\frac{1}{2}$ inch long, rind very thin, of fruit white ... ... *Ney poovan*
Fruit whitish green ... ... *Chakkarakali*
Rudimentary ovaries of the staminate flowers deciduous, peduncle pubescent—
Peduncle less than 7 inches long, fruit blunt ... ... *Nalla chakkarakali*
Peduncle less than 4 inches long, apex $\frac{3}{4}$ to 1 inch long ... ... *Matti*
Peduncle more than 12 inches long—
Fruit often green when ripe—
Fruits blunt—
Fruits straight and terete ... *Anai komban*
Fruit curved and terete ... ... *Pedda pacha arati*

Heart present—*cont.*

Heart purple—*cont.*

Heart and axis nearly horizontal to stem for about a foot in length and then drooping—*cont.*

Redimentary ovaries of the staminate flowers deciduous, peduncle pubescent—*cont.*

Peduncle more than 12 inches long—*cont.*

Fruit not green when ripe—

Fruit apex ¾ to 1 inch long ... *Maaniyilla chingen*

Margin of petiole left side winged ... *Karivazhai*

Margin of petiole not winged, leaf blade, right side 3½ inches shorter than left—

Apex of fruit ½ inch long ... *Gros Michel*

Apex of fruit blunt ... ... *Karim kadali*

Heart and the naked part of axis drooping and nearly parallel to stem—

Stem purplish green—

Apex of fruit ½ inch long ... ... *Poovan*

Apex absent ... ... *Motta poovan*

Stem blue black or purplish blotched, anthers dark ... ... *Krishna vazhai*

Stem not purplish green or blue black—

Pulp of ripe fruit granular ... ... *Tiruvananthapuram*

Pulp of ripe fruit not granular—

Arthers dark—

Apex of fruit absent ... ... *Pacha naadan*

Apex of fruit present—

Apex ¾ to 1 inch long ... ... *Kapur*

Apex ½ inch long, heart dries up at maturity of bunch ... ... *Kaali*

Apex less than ½ inch—

Ripe fruits easily drop off from pedicel ... ... *Vannan*

Ripe fruits do not easily drop off from pedicel—

Pulp dry, fruits keep for about 2 weeks ... ... *Virupakshi*

Pulp juicy, fruits keep for about a week only ... ... *Sirumalai*

Anthers not dark—

Plants small-sized, leaves narrow, rather erect—

Fruit 4 to 5 inches long—

Fruit ashy coated ... ... *Vennettu kunnan*

Heart preeent—*cont.*
Heart purple—*cont.*

Heart and the naked part of axis drooping and nearly parallel to stem—*cont.*

Stem not purplish green or blue black—*cont.*

Pulp of ripe fruit not granular—*cont.*

Anthers not dark—*cont.*

Fruit not ashy coated—	
Fruit nearly terete, apex ½ inch long	*Kunnan*
Fruit 5-ribbed; apex ½ to ¾ inch, pulp of ripe fruit white	*Thaen kunnan*
Fruit 2 to 3 inches long, apex ½ inch long	*Adakka kunnan*
Plant very tall and stout, leaves very long and broad—	
Fruits 5-unequal sided—	
Fruit compressed	*Peyan*
Fruits ashy coated	*Boothi bale*
Fruits shining at maturity ...	*Enna benian*
Fruits 5-ribbed—	
Apex ½ to ¾ inch long—	
Tall and stout and late variety.	*Pey laadan*
Short and early variety, fruit lightly ashy coated ...	*Mayil vazhai*
Apex ½ inch long, margins of petiole overlapping	*Pey kunnan*
Apex ¼ inch long, fruit turned to the peduncle	*Kostha bontha*
Plant stout and medium tall, leaves broad, lamina base deeply auricled on both sides to 3½ inches—	
Fruit ashy coated	*Vennettu mannan*
Fruit not ashy coated	*Ney mannan*
Plant medium tall and medium stout—Fruit about 40 in a bunch—	
Fruit upto 10 inches long, 1½ inches across—	
Apex of fruit stout, 1½ inches long—	
Fruit ashy coated ...	*Sambrani monthan*
Fruit not ashy coated ...	*Monthan*
Apex not distinct—	
Fruit ashy coated ...	*Thella bontha*
Fruit not ashy coated ...	*Nalla bontha*

Heart present—*cont.*
Heart purple—*cont.*

Heart and the naked part of axis drooping and nearly parallal to stem—*cont.*

stem not purplish green or blue black—*cont,.*

Pulp of ripe fruit not granular—*cont.*

Plant medium tall and medium stout—Fruit about 40 in a bunch—*cont.*

Fruit up to 5 inches long and 1 inch across, apex about ¾ inch long —

Heart about 10 inches long nearly touching the ground at harvest time ... ... *Kallu monthan*

Heart normal ... ... *Kuri bontha*

Fruit about 150 in a bunch, fruits 4 to 7 inches long, 5-ribbed —Apex of fruit stout, ¾ to 1¼ inch long—

Fruit ashy coated ... *Booditha montha bathees*

Fruit not ashy coated ... *Pacha montha bathees*

Apex not distinct ... ... *Nalla bontha bathees*

Seeded bananas

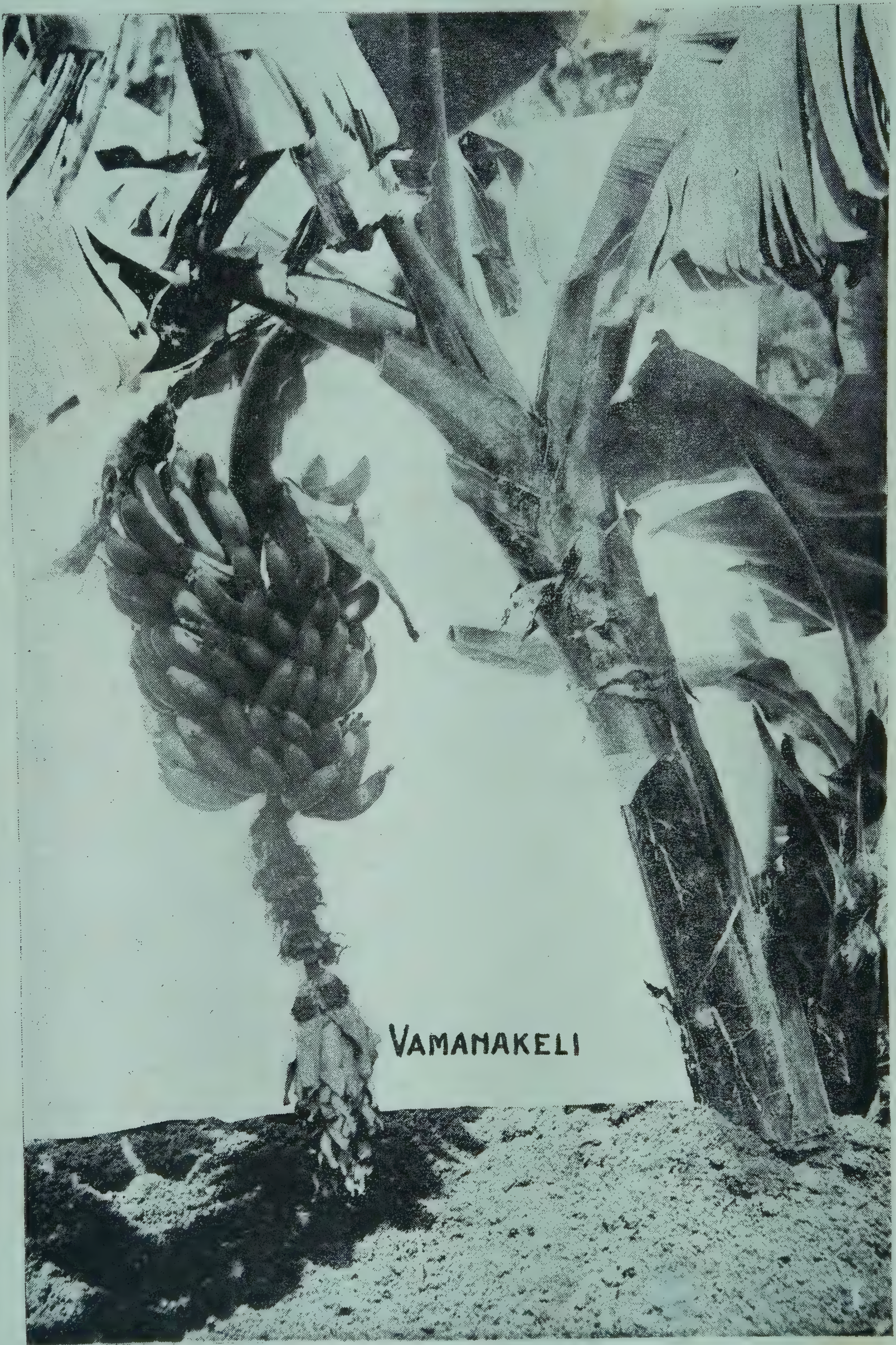
Pedicel of fruit: short ⅓ inch Leaves yellowish green, shining. kattuvazha (*Musa kattuvazhana* K. C. J.)

Pedicel of fruit: long ¾ inch.

Stem and lower surface of leaf ashy coated, fruits terete. *Naaru vazha* (Musa textilis Nee)

Steam and leaf not ashy coated, fruit 5-ribbed, leaves green. *Elavazhai* (*Musa balbisiana* colla.)

Note.—Unless otherwise mentioned, by 'fruit' is meant the unripe mature **fruit**


VAMANAKELI

CHAPTER VI

DESCRIPTIONS OF THE BANANA VARIETIES

Vamanakeli—Musa sapidisiaca K. C. Jacob. nom. nov. var. *cavendishii* (Lamb.) Jacob. (*Musa Cavendishii* Lamb.; *M. Sinensis* Sagot.; *Musa chinensis* Sweet.)

English names.—Cavendish, Canary Islands banana, Dwarf Chinese, Dwarf Jamaica, Governor.

Local names.—Madras (Tamil) *Kandy vazhai, Kari vazhai, Kooli vazhai, Kooni vazhai, Kuli vazhai, Kullan* (Coimbatore), *Kutta vazhai, Kuttaththi vazhai, Kuzhi nendran, Morris vazhai, Nilamutti, Nila vazhai, Pachcha vazhai*; (Telugu) *Gidda arati, Pachcha arati, Vahana arati, Vamana arati, Vamana chakkarakeli, Vamanakeli*; (Hindustani) *Hara mowze*; (Kanarese) *Guja bale, Gujari bale, Kabul bale, Pachcha bale*; (Bombay) *Basarai*; (Orissa) *Mauritius, Kabuli, Harichall*; (Assam) *Jahaji kol*; (Burma) *Wet-ma-lut*; (Malaya) *Pisang serandah.*

It is a dwarf variety with close set, broad leaves, and a heavy bunch of fruits almost touching the ground, and with upturned purple coloured bracts. The bunch is ready for harvest in about 13 months after planting the sucker. The variety is comparatively of recent introduction into India and there is great demand for the fruits in many places especially in the cities of Bombay and Madras. Extensive areas are cultivated near Tiruchirappalli for the Madras market. Because of its short stature it needs no prop. When grown as a pure or unmixed crop only one harvest is taken and it is followed by two crops of rice. The " heart " is removed soon after the opening of all female hands in some places like Tiruchirappalli, to promote better development of fruits. Groundnut cake is generally applied as manure. Pits of two feet cube are dug, seven feet apart and filled to about one-half with well decomposed cattle manure; and the top half of the pit is covered with surface earth and suckers are planted in the middle of the pit. The colour of fruits harvested during cold weather remains nearly green even when ripe. Those harvested during hot weather, however, take an yellowish tinge. It is largely grown in the Canary Islands from which place the fruits are exported to Europe. The ripe fruits grown in these Islands have a rich yellow colour.

Stem short, stout, yellowish green with large dark blotches, 4 to 5 feet high, circumference at base 22 to 24 inches. *Leaf very

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NOTE.—* The description of banana leaves given in this book, is of the view presented by the leaf as cut and placed before the reader, with the stalk (petiole) near and apex away, and the upper side exposed to view.

broad, elliptic, broader towards base, brittle, smooth above, glaucous below ; petiole short, stout, 6 to 9 inches long, margins of petiole red coloured in young plants ; channel of petiole $2\frac{1}{2}$ to 3 inches wide, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches deep and $7\frac{1}{2}$ to $8\frac{1}{2}$ inches in circumference in the middle of the petiole, margins wide open and broadly winged ; lamina base unequal, right side short by 1 inch, cordate, left side narrowly acuminate, leaf blade $3\frac{1}{2}$ to $4\frac{1}{2}$ feet long, 22 to 26 inches broad, width of right side of the lamina greater than the left by one inch, number of leaves 31 with an average monthly emergence of 4. Shot blades 2, bottom, $3\frac{1}{2}$ feet, the lamina portion $1\frac{1}{2}$ feet long, 1 foot broad ; top, 2 feet with the lamina portion 3 inches by $1\frac{1}{2}$ inches, distance between the two shot blades $1\frac{1}{4}$ foot. * Inflorescence, puduncle pubescent, 8 to 10 inches long, drooping, parallel to the stem. It has only female and persistent male flowers. Length of fertile axis 1 foot to $1\frac{3}{4}$ feet and the persistent staminate portion $1\frac{1}{2}$ to 2 feet, often almost touching the ground when ready for harvest. Bract persistent, colour outside light purple, sparsely glaucous, colour inside reddish yellow with parallel corrugations, 23·4 centimetres long, 12·2 centimetres broad ; apex obtuse with a notch of 1·2 centimetre. † Flower, persistent male, 6·1 centimetres long, 0·4 centimetre broad, 0·7 centimetre deep.

Calyx (perigonium) 4·2 centimetres long, 1·7 centimetres broad, colour of calyx outside dull white with light brown spots outside, dull white with light brown blotches inside ; lobes 5, two hardly smaller, alternating with three larger, yellow ; keels two, prominent in the outer series, the two sides upright, the basal portion touching. Petals (scale) 2·2 centimetres long, 1·6 centimetres broad, roundish, hyaline ; ridges 3, prominent ; apex abruptly acute, erect, ridges nil. Stamens 5, 3·7 centimetres long, erect ; filament 1·6 centimetres long, white, flat and slightly grooved on the upper side ; anther 2·3 centimetres long, straight, white ; anther valves dull white ; pollen not present. Pistillode 6 centimetres long ; style 3·7 centimetres long, white with pink spots in the top half ; stigma yellow ; lobes 5, not prominent. Ovary persistent, 2·3 centimetres long, greenish white, tapers towards base, rather stout ; wrist prominent, hirsute, 1 inch broad towards the base of the bunch. Pedicel $\frac{1}{2}$ to $\frac{3}{4}$ inch long, 4 to 5-unequal sided, 4 to 5-ridged, 2 to 3 ridges

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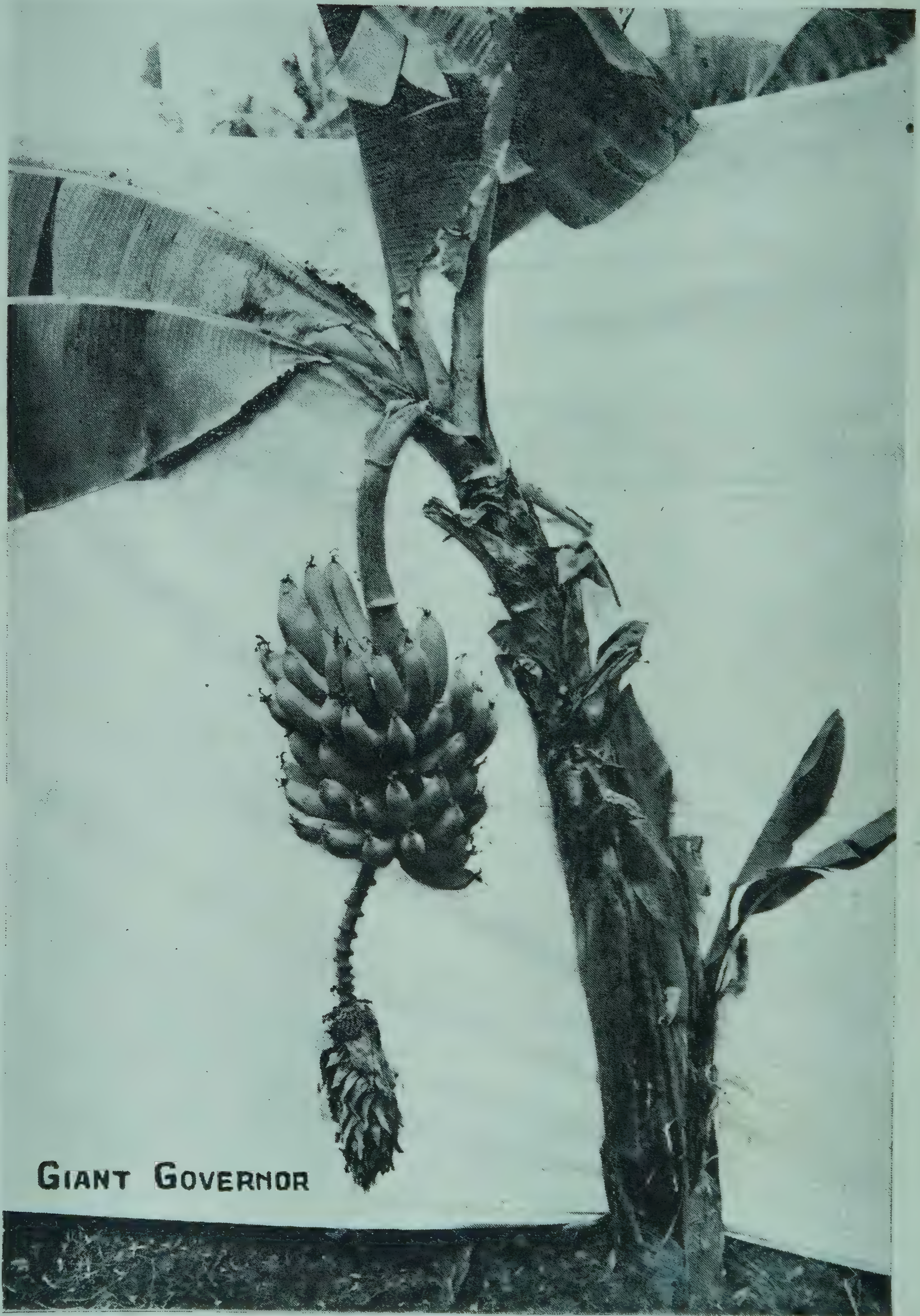
* The infloresences of bananas are described here as if they are erect even though they are partially or completely drooping in all the species and varieties dealt within this book.

† The pistillate (female) flowers have very large ovaries ranging from $1\frac{1}{2}$ to 6 inches in length in proportion to the length of the ultimate fruits which are from $2\frac{1}{2}$ to 12 inches long. The perianth (perigonium and scale) which is borne on the ovary is not fully developed as in the staminate (male) flowers and the stamens which are also borne on the ovary are abortive. The female flowers are, therefore, not described here as they do not help in the identification of species or varieties.


GIANT GOVERNOR

prominent. Hands rather compact, 8 to 10 ; fingers (fruits) compact, 11 to 23 in a hand, slightly bent towards the base, cylindric with five ridges, two being slightly prominent, 6¼ to 6½ inches long and 4¼ to 4½ inches in circumference, 100 to 180 in a bunch ; apex very short, ⅛ to ¼ inch long, fruit tapers to apex, does not easily drop off from the pedicel ; rind when ripe green, yellowish green, greenish yellow and pale yellow ; medium thick, fragile (fruits could be broken easily with the skin) ; dark spotted when very ripe ; pulp light cream-coloured, sweet, slightly spicy with agreeable flavour. A good dessert banana. The bunch weighs 30 to 50 lb. It is not used as vegetable for cooking purposes.

LATIN.—*Mua ssapidisiaca* K. C. Jacob var. *cavendishii* (Lamb.) Jacob, vide descriptionem *Musa Cavendishii* lamb.

GIANT GOVERNOR

Giant Governor.—Musa sapidisiaca K. C. Jacob. nom. nov. var. *giant governorana* Jacob.

Local names.—(Bombay) Mhuskela ; (West Indies) Giant Governor.

It is a small-sized plant introduced into India from the West Indies. The stem is rather short and slender. The withered bracts and flowers adhere only to the top half of the axis, the basal half being naked. It takes about 13 months to mature from time of planting to harvest stage. This is one of the delicious varieties of bananas, similar to *Vamanakeli* in all respects, except the size of the plant. This was obtained from Trinidad, and it is thriving well in South India. It does not exhaust the soil like *Vamanakeli.* it requires propping when in bunch owing to the slender stem of the plant.

Stem dark purple with greenish tinge, 5 feet high, circumference at base 19½ inches. Leaves slightly glaucous below ; petiole 8 inches long, 6·6 inches in circumference ; channel of petiole 2 inches wide, 1·4 inch deep, margins winged, pinkish to ⅛ inch broad ; lamina 5 to 5½ feet long, 26¼ inches broad, leathery ; lamina base subequal, right side truncate and abruptly acute, left side obtuse and abruptly acute ; apex right side truncate, left side 80°. Shot blades 2, bottom semi-erect, 43 inches long, lamina portion 30½ inches long, 17 inches broad ; top, base 2 inches alone green, rest dried, 28 inches long, lamina portion 5 inches long, 2¾ inches broad. Inflorescence, peduncle hairy, 8½ inches long, position of mature bunch 20° to the stem and almost pendulous. It has female, deciduous male and persistent male flowers ; dried bracts persist in the region of the persistent male flowers ; fertile axis 15 inches long, deciduous male portion up to 9 inches long, persistent male portion of the axis about one foot long. Bracts deciduous in the bottom dozen hands and the rest persistent, colour outside dull purple, very glaucous, inside purplish white, with slight corrugations, 26 centimetres long, 13·5 centimetres broad ; apex obtuse and notched in the basal ones. Flower, deciduous male in the bottom dozen hands and then persistent male, 7·2 centimetres long, 6 millimetres broad, one centimetre deep. Calyx (perigonium) 4·5 centimetres long, 2 centimetres broad, outside and inside dull white with a few dark dots, lobes 5, 3 large alternating with 2 small, yellowish, keels 2, those of the upper florets very prominent and of the lower not prominent. Petals (scale) 2·5 centimetres long, 2·2 centimetres broad, boat-shaped, two sides vertical, semi-transparent, ridges 2, not prominent ; apex acuminate, not prominent, ridge one. Stamens 5, 4·5 centimetres long, overtopping the stigma ; filament 2 centimetres long, dull white, slightly flat with a prominent bent at the beginning of the anther ; anther 2·5 centimetres long, stout, yellowish white ; anther valves dark grey ; a few pollen grains present. Pistillode 6·7 centimetres long ; style and stigma 4·1 centimetres long ; style whitish with reddish dots ; stigma yellowish, erect ; lobes 3, not very prominent. Ovary deciduous and persistent, 2·7 centimeters long, whitish green, 5-unequal sided, tapering towards base. Pedicel ½ inch long, 4 to 5-unequal sided, 4 to 5-ridged, 2 ridges very prominent ; hands compact, 5 to 8 ; fruits turned towards base ; fingers compact, 12 to 14 in a hand, terete with 5 ridges, 2 ridges prominent, 6 inches long, nearly 4½ inches in circumference ; fruit tapers to apex ; apex ¼ inch long, 5-ridged, 2 ridges very prominent ; about 60 to 80 fruits in a bunch ; ripe fruits do not easily drop off from the pedicel ; rind medium thick, ripening to yellowish green, pulp cream-coloured, very soft, juicy and very sweet with good flavour.

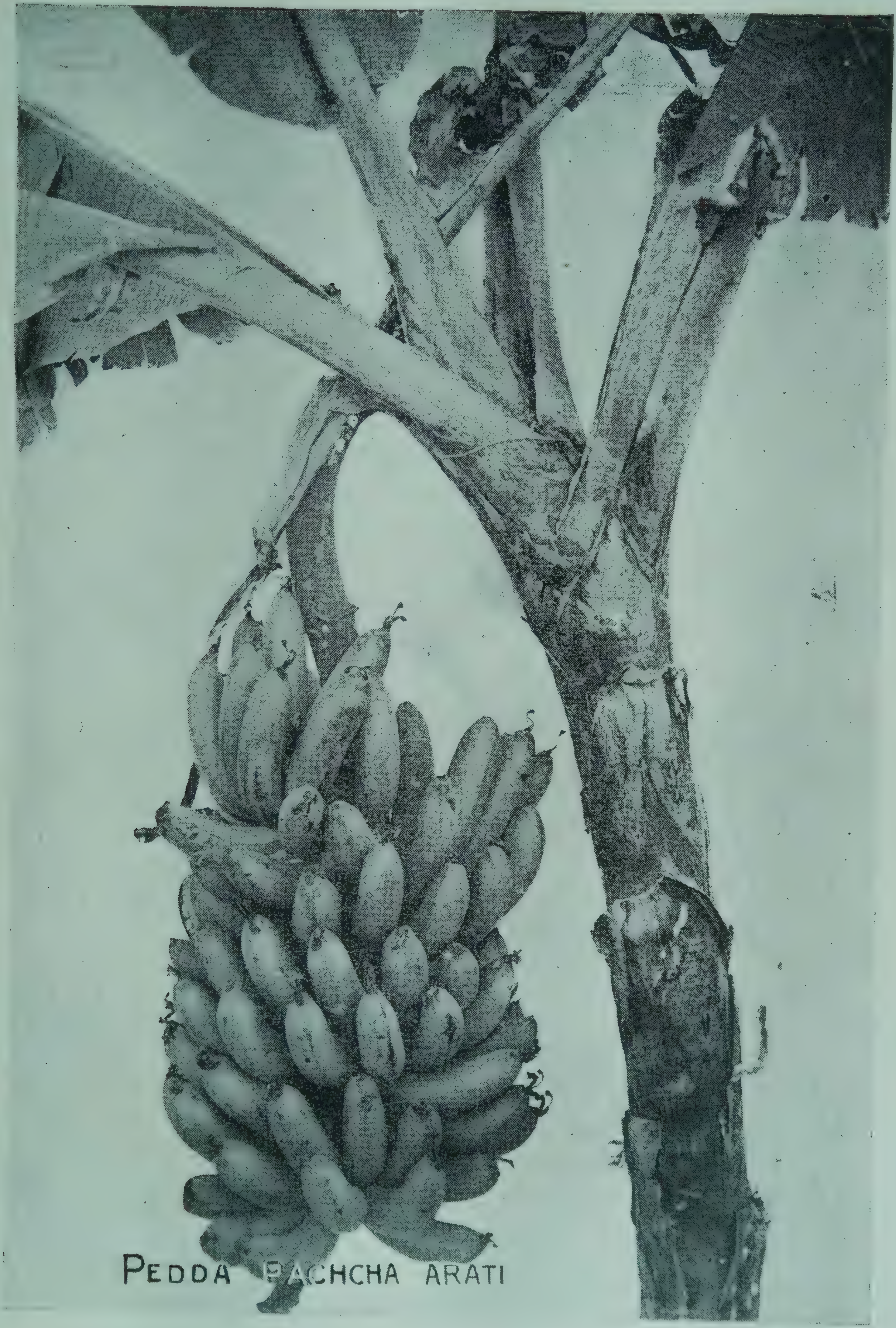
LATIN.—*Musa sapidisiaca* K. C. Jacob, var. *giantgovernoriana* Jacob : cognata, sed tenui longoque trunco ab ea differt. Praeterca sola dimidia pars superior axis florescentis supra fructuum regionem marcidis bracteis et staminatis floribus persistibus coopertur.

PEDDA PACHCHA ARATI

Pedda pachcha arati.—Musa sapidisiaca K.C Jacob, nom. nov. var. *Peddapachchaaratiana* Jacob.

Local names.—Madras—(Tamil) *Pachcha vazhai neeththal* ; (Telugu) *Pedda pachcha arati* ; Orissa—*Malbhog*.

It is a medium-sized plant found only at Kalava in the Kurnool district and at Sadras in the Chingleput district in the Madras



PEDDA PACHCHA ARATI

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Province. The bunches are heavy and the fruits are larger than those of *Vamanakeli*. The axis is completely naked since all the male flowers drop off after opening. It takes about 13 months to mature from time of planting to harvest stage. It is identical with *Vamanakeli* except that it is a much taller plant with deciduous male flowers and bracts. It is a very rare variety and deserves to be grown extensively as the bunch is large and abounds in tasty fruits.

Stem dark purple with greenish tinge, 6½ feet high, circumference at base 20½ inches. Leaves very slightly glaucous below, leathery; petiole greenish yellow and glaucous, 11 inches long; channel of petiole 1½ inches wide, 1¼ inch deep; margin of petiole winged, pinkish to 1/6 inch broad; lamina 6 feet long, 25 inches broad, lamina base sub-equal, right side narrowly obtuse, left side acute; apex of lamina, right side truncate, left side 80°. Shot blades 2, bottom 34 inches long, lamina portion 19 inches long, 13½ inches broad; top (dried) 22 inches long, lamina portion 2½ inches long, 1½ inches broad; distance between the two 6 inches outside and the rest inside. Inflorescence, peduncle pubescent, 15 inches long, position of mature bunch 20° to the stem, pendulous and nearly parallel to the stem. It has female and deciduous male flowers only; fertile axis 15 inches long, deciduous portion, rather stiff, 2 feet long, bases of wrists prominent. Bracts deciduous, colour outside deep purple, glaucous, revolute to 2/3, inside brown, red and pale white mixed towards the apex, pitted longitudinally in lines, 32·6 centimetres long, 16·7 centimetres broad; apex broadly obtuse. Flower, deciduous male, 8·5 centimetres long, 1·2 centimetres broad, 0·9 centimetre deep. Calyx (perigonium) 5·3 centimetres long, 2·3 centimetres broad, calyx dirty white both outside and inside; lobes 5, 3 larger alternating with 2 smaller inside, horn-like awns at the ends, yellow, keels 2, prominent. Petals (scale) 2·6 centimetres long, 2·4 centimetres broad, boat-shaped, pale white, semi-transparent; without ridges, apex acuminate, straight, ridges 2. Stamens 5, 5·2 centimetres long, equal; filament 2·5 centimetres long, white, flat with a groove in the middle; anther 2·7 centimetres long, tip bent back with a groove in the middle; white; anther valves dark. Pistillode 8·1 centimetres long; style and stigma 5 centimetres long, white; stigma dull yellow, lobes 3, not prominent. Ovary deciduous, 3·1 centimetres long, light green, 5-sided, tapering towards the base. Pedicle 1 inch long, nearly terete, 5-ridged, 3 ridges prominent, hands compact, 7 to 9; fingers compact, 12 to 15 in a hand, terete with 5 indistinct ridges, 2 slightly prominent, 6½ inches long, 5 inches in circumference, about 100 in a bunch; fruit tapers to apex; ripe fruits not dropping off easily from the pedicel; rind medium thick, ripening to green, yellowish green and yellow; pulp light cream-coloured, sweet, juicy, slightly spicy with agreeable flavour. It is a good dessert banana.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *peddapachchaaratiana* Jacob: cognata, sed ab ea differt longo mediocriter pingui trunco et absentia bractearum vel florum staminatorum persistentium in parte superiori axis florescentis.

NENDRAN

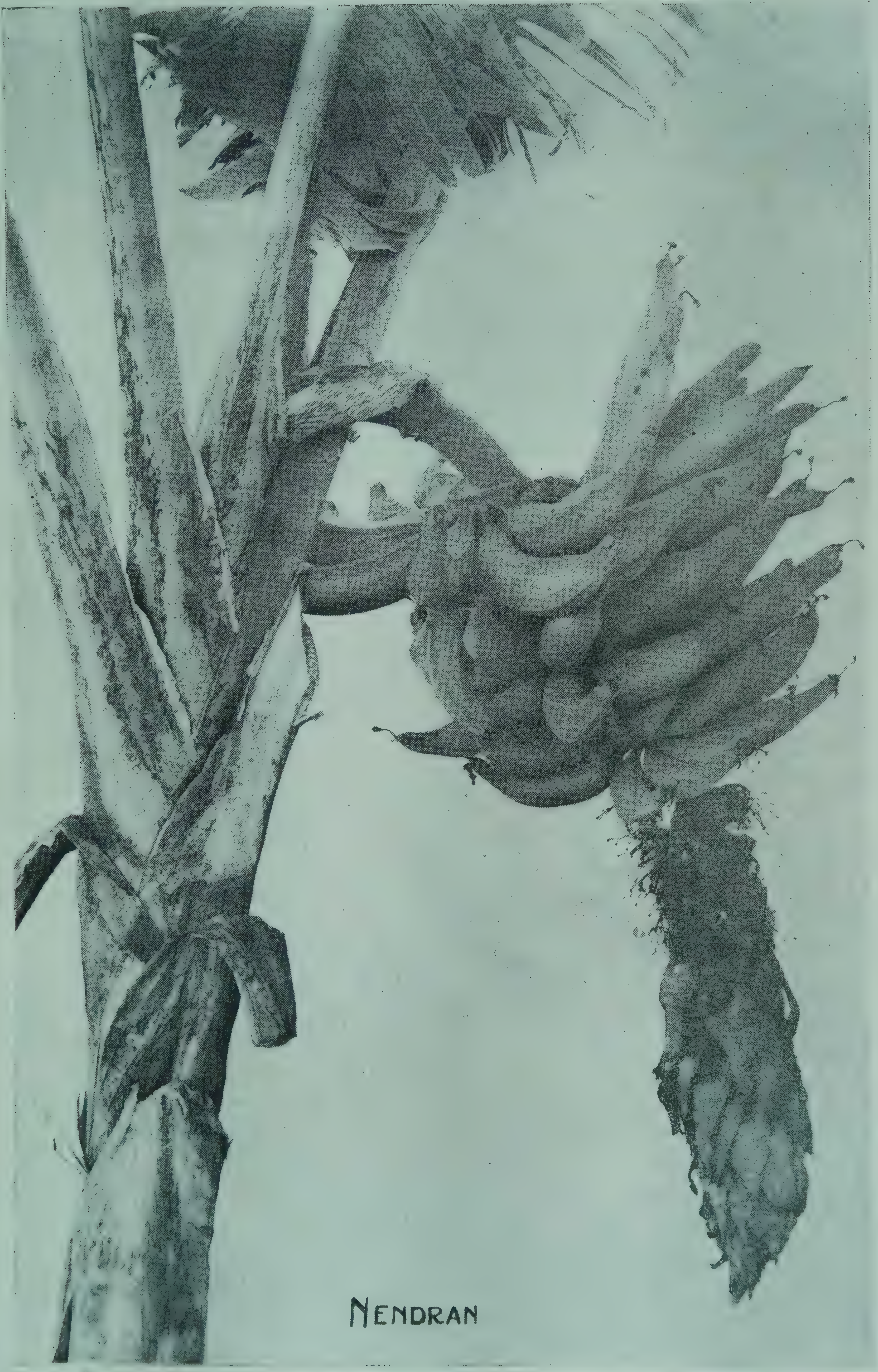
Nendran: *Musa sapidisiaca* K. C. Jacob, nom. nov. var. *plantaniana* Jacob.

English name—The plantain, Horn plantain, Nicaragha.

Local names.—Madras (Kanarese) *Nana nendran*, *Nendran*; (Malayalam) *Chengazhi kodan*, *Eththakka*, *Kal eththan*, *Nana nendran*, *Nendran*, *Pindi eththan*, *Thiruvonan*; Malaya—*Pisang tun dok*, *Pisang ton doc* (or *talan*).

It is a medium-sized plant with very long fruits. It is grown extensively as rain-fed crop on the West Coast of the Madras province. The leaves of the young plants incline towards the ground unlike the other varieties. These leaves of the young plant have dark blotches, one to 1½ inches in diameter. The margin, to a width of ¼ inch, of the petiole and of the upper half of the outer leaf sheaths are reddish in colour. It takes about 11 months to mature from time of planting to harvest stage. It is largely grown as pure stand on the Malabar Coast. It is replanted year after year from fresh suckers. It has been under cultivation on the Malabar Coast from time immemorial. Rheed mentions this in the Hortus Malabaricus published in the year 1686. This fruit, in all the various dishes into which it is turned in the Malabar cuisine, is a *sine qua non* at the banquets of the malayalee population of the Malabar Coast during their festivities. Ripe or unripe, it lends itself to many adaptations. Ripe fruits are ordinarily consumed after steaming. Banana 'figs' and 'halva' are the delicacies into which the ripe fruits are turned out and they are popular. The unripe fruit is used for culinary purpose and serves as a side-dish for a meal of rice. Cut into slices and fried in coconut oil, they serve as the well-known banana chips, that keep well for 2 to 3 months and are even exported to Baghdad in exchange for dates from that region. The flour obtained from the unripe banana is utilized as food for children on the Malabar coastal tracts.

Stem yellowish green with reddish tinge, 9 to 11 feet high, circumference at base 22 to 24 inches. Leaves leathery, polished; petiole 12 to 15 inches long, circumference 3½ to 4 inches, margins of petiole nearly touching or slightly overlapping, red to 1/8 inch broad;



NENDRAN

channel 5/8 inch deep ; lamina 6 to 6¼ feet long, 25 to 29 inches broad ; lamina base right side ½ inch short, very broadly obtuse, left side abruptly acuminate ; apex of lamina, right side truncate, left side 550 ; number of leaves 25 with an average monthly emergence of 4. Shot blades 3, bottom 3 feet long, the lamina portion 23 inches long, 10½ inches broad ; top 21 inches long, the lamina portion 8 inches long, 3 inches broad ; topmost 19 inches long, lamina portion 2 inches long, 1½ inches broad ; distance between the first two shot blades 10 inches. Inflorescence, peduncle 15 inches long glabrous, drooping. It has female and persistent male flowers only ; fertile axis 10 inches long, persistent male portion of axis 1½ to 2 feet long. Bract persistent, outside purple, glaucous, inside red with parallel wrinkles, dark red towards margins, 25·5 centimetres long, 11·7 centimetres broad ; apex very broadly obtuse. Flower persistent male, 6·4 centimetres long, 0·7 centimetre broad, 0·6 centimetre deep. Calyx (perigonium) 6 centimetres long, 2 centimetres broad, calyx outside cream-coloured with reddish blotches towards base, inside creamy white with red blotches ; margins hyaline ; lobes 5, 3 large alternating with 2 small, sometimes the lobes are of varying length, yellow ; keels 2. Petals (scale) 3·7 centimetres long, 3·6 centimetres broad, boat-shaped, 2 sides touching towards the base, hyaline, with yellowish tinge inside ; number of ridges 3, rather prominent ; apex long, broadly acute, tip yellowish. Stamens 5 to 6, 5·4 centimetres long, erect ; filament 2·3 centimetres long, cream-coloured, flat ; anther 3 centimetres long, erect, yellowish with cream-coloured valves, anther valves cream-coloured. Pistil 9·2 centimetres long ; style 5·4 centimetres long, whitish ; stigma yellowish, number of lobes 6, rather large. Ovary persistent, 4 centimetres long, whitish green, 4 to 5-unequal sided, gradually tapering towards base. Pedicel one inch long, 4 sides of unequal width, 4-ridged, 2 ridges prominent ; hands 4 to 6, very loose ; fruits 8 to 10 in a hand, 8 inches long, circumference 6 inches, nearly terete, 3 to 4-ridged, 2 ridges very prominent ; apex stout, ½ inch long, 3 to 4-sided, 3 to 4-ridged, 3 ridges prominent with the basal portion of stigma persisting, fruit tapers to apex, 35 to 50 in a bunch ; fruits strongly held to the pedicel ; rind when ripe yellowish, when fully ripe turns dark ; thick ; pulp flesh coloured and tough.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *plantaniana* Jacob : vide descriptionem *Musa paradisiaca* L.

KAALIETHTHAN

Kaali eththan.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *plantaniana* Jacob, forma *kaalieththaniana* Jacob.

Local names.—Madras (Malayalam) *Kaali eththan*, *Vaali eththan.*

It is a type of *Nendran* with long fruits ; but the length of apex is the same and it has generally more fruits in a bunch. It is largely cultivated in Central Travancore.

Description of plant, leaf, flower, and fruit, same as *Nendran.*

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *plantaniana* forma *Kaalieththaniana* Jacob : cognata, sed ab ea differt largiori racemo, fructibusque longioribus.

ELERI

ELERI.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *plantaniana* Jacob, forma *eleriana* Jacob.

Local names.—Madras (Tamil) Aanai *komban* (Sadras, Chingleput district), *Nendran, Thaen vazhai, Yeththan* ; (Telugu) *Nendran,* (Kanarese) *Nendra bale* ; (Malayalam) *Eleri, Aattu Nendran, Nedu Nendran, Nendra vazha.*

It is a type of *Nendran* with long fruits and long apex. The fruits may be a foot long and the apex 1 to 1½ inches long. There are more hands and more fruits in a bunch than *Nendran.* The red tinge of the stem is not well developed as in *Nendran.* This grows entirely on rainfed conditions in places with about 100 inches of rainfall while *Nendran* requires in addition to it irrigation in the early stages. It is largely cultivated throughout the Malabar Coast but it takes two months more than *Nendran* to attain maturity of fruits to the harvest stage.

Description of plant, leaf, flower and uses, same as *Nendran.*

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *plantaniana* forma *eleriana* Jacob : cognata, sed ab ea differt longiori apice fructuum crescit ut fruges pluvia alitae in locis ubi pluviae lapsus est supra 100 inch.

KALETHTHAN

Kaleththan—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *plantaniana* Jacob, forma *kaleththaniana* Jacob.

Local names.—Madras (Malayalam) *Kaleththan.*

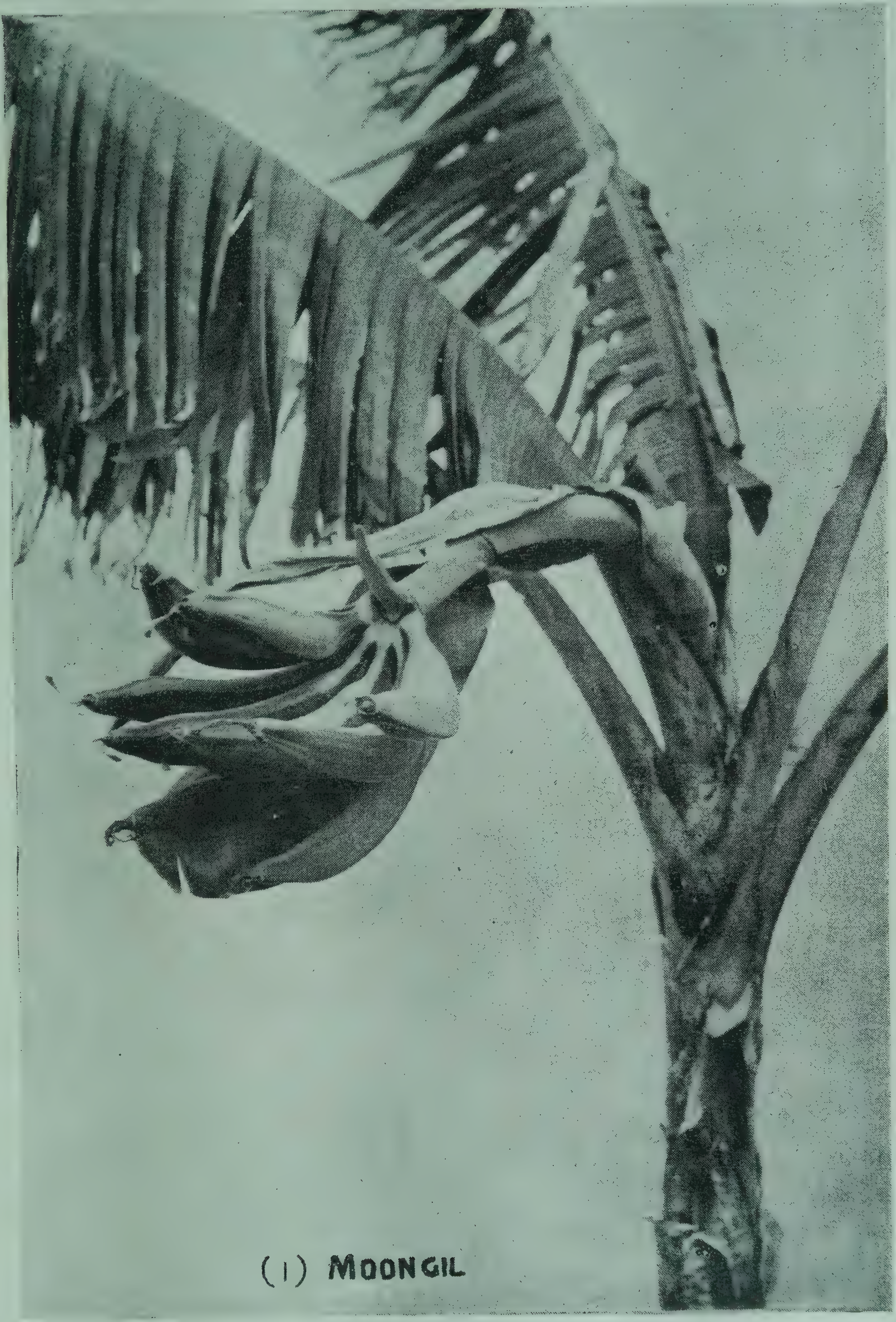
It is a type of Nendran with very short fruits often up to 5 inches long ; apex also short, ½ inch long ; rind and pulp harder than those of other types of *Nendran.* Stray plants are seen at Cherayerambu in Central Travancore and it is not an economic variety.

Description of plant, leaf, flower, and uses, same as *Nendran.*

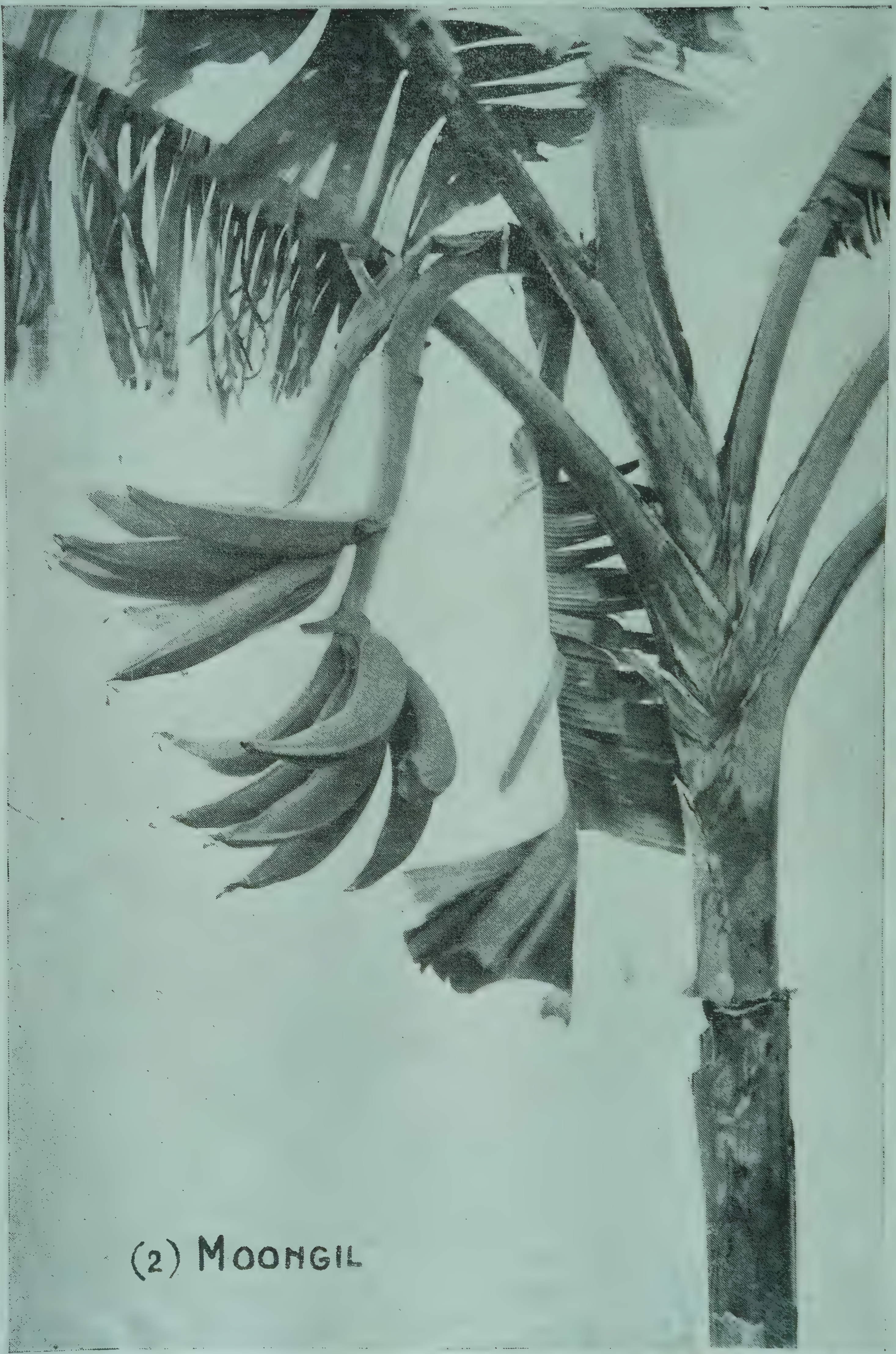
LATIN.—*Musa sapidisiaca* K. C. Jacob var. *plantaniana* forma *kaleththaniana* Jacob : cognata, sed ab ea differt fructibus brevioribus, circiter 6 inch. longis cumbrevi apice.

VELATHTHAN

Velaththan.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *plantaniana* Jacob, forma *velaththaniana* Jacob.



13. MOONGIL WITH ONE HAND



14. MOONGIL WITH TWO HANDS

Local name.—Madras (Malayalam) *Velaththan.*

It is a type of *Nendran* with blood red stem, petiole and midrib. Even the lamina towards the margin has the reddish tinge, but the fruits are greenish and in the ripening stage take the common yellow colour. It is a very rare variety found only at Cherayerambu in Central Travancore.

Description of plant except the colour, leaf, flower, fruit and uses, same as *Nendran.*

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *plantaniana* forma *velaththaniana* Jacob : cognata, sed ab ea differt sanguineo rubro trunco.

MYNDOLI

Myndoli.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *plantaniana* Jacob, forma *myndoliana* Jacob.

Local name.—Madras (Kanarese and Malayalam) *Myndoli.*

It is a type of *Nendran* with much taller and stouter stem than those of other types, having bunches of 6 to 8 hands and 60 to 90 fruits. Fruits up to one foot long, apex 1½ inches long. It is a heavy yielder but requires regular irrigation and heavy manuring. The colour of stem is yellowish green like that of *Eleri.* It is grown only in one or two places in South Malabar. It further differs from other types of *Nendran* in having the right side of lamina 1½ inches shorter than the left.

Description of plant, leaf, flower and uses, same as *Nendran.*

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *plantaniana* forma *myndoliana* Jacob : cognata, sed ab ea differt longo pinguique trunco, largissimis racemis, fructibus supra unam pedem longis.

MOONGIL.

Moongil.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *corniculata* (*Rumph.*) Jacob.

Local names.—Madras (Malayalam) *Moongil, Otta mukil* : Orissa—*Singapuri* ; Malaya—*Pisang tando.*

It is a type of *Nendran* with often only one hand of fruits. It is believed to have been introduced into this country from Malaya. It differes from *Nendran* in the following respects. The inflorescence has only female flowers often confined to one, rarely two and very rarely 3 hands, all developing into fruits. Fruits and their apices are longer than those of *Nendran* : fruit terete, curved 5 ribbed, 2 ribes very prominent. A single fruit may sometimes be

13 to 14 inches long, 6 to 7 inches in circumference, weighing up to $1\frac{1}{2}$ lb. It is not an economic variety.

Description of pant, leaf, fruit and uses, same as *Nendran.*

Latin.—*Musa sapidisiaca* K. C. Jacob var. *corniculata* (Rumph.) Jacob : cognata, sed ab ea differt eoquod adsit unica manus fructum rarissime 2 vel 3, sine floribus masculis quibusquam vel sine floribus masculis persistentibus.

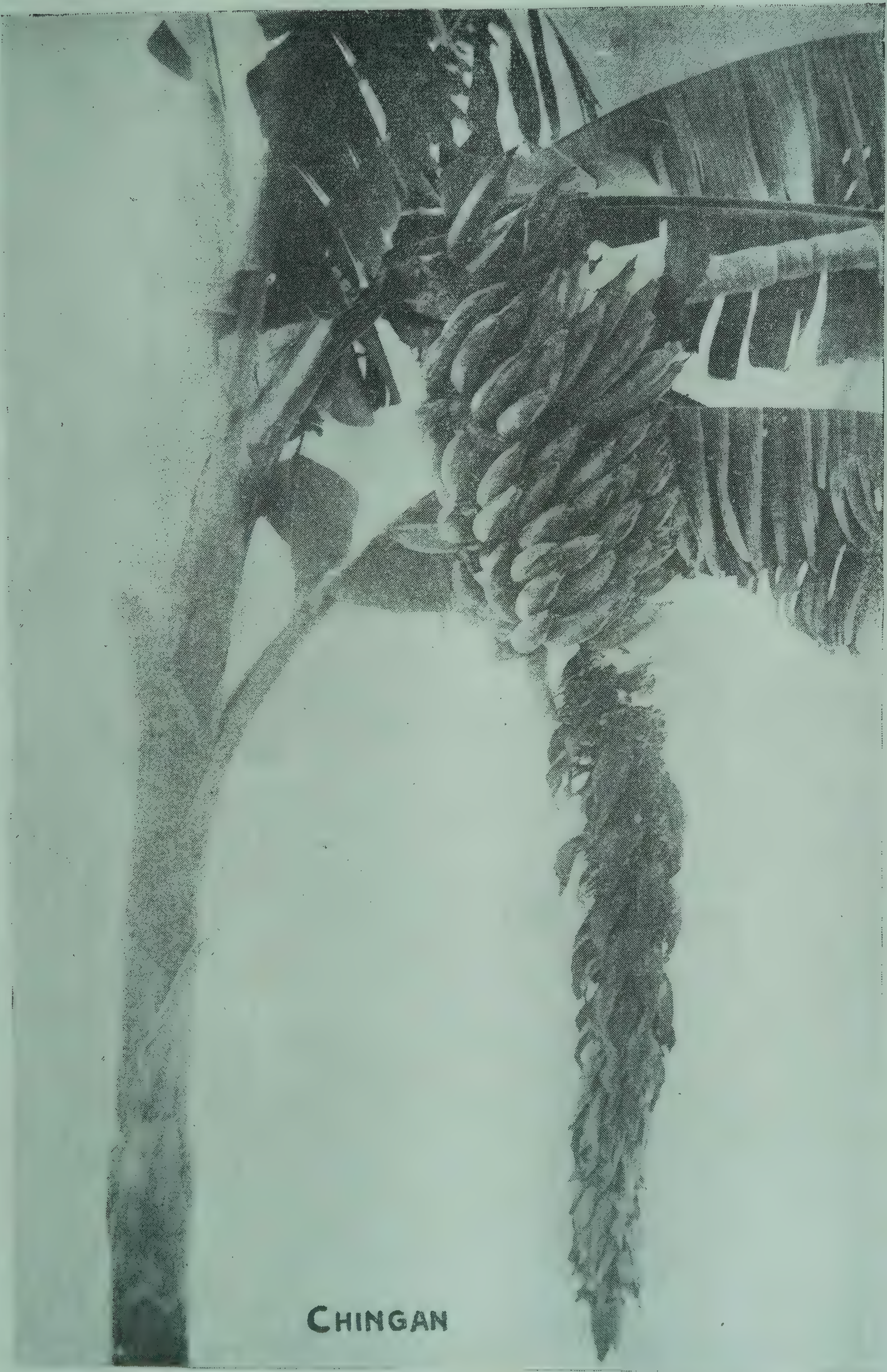
Chingan

Chingan.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *chinganiana* Jacob.

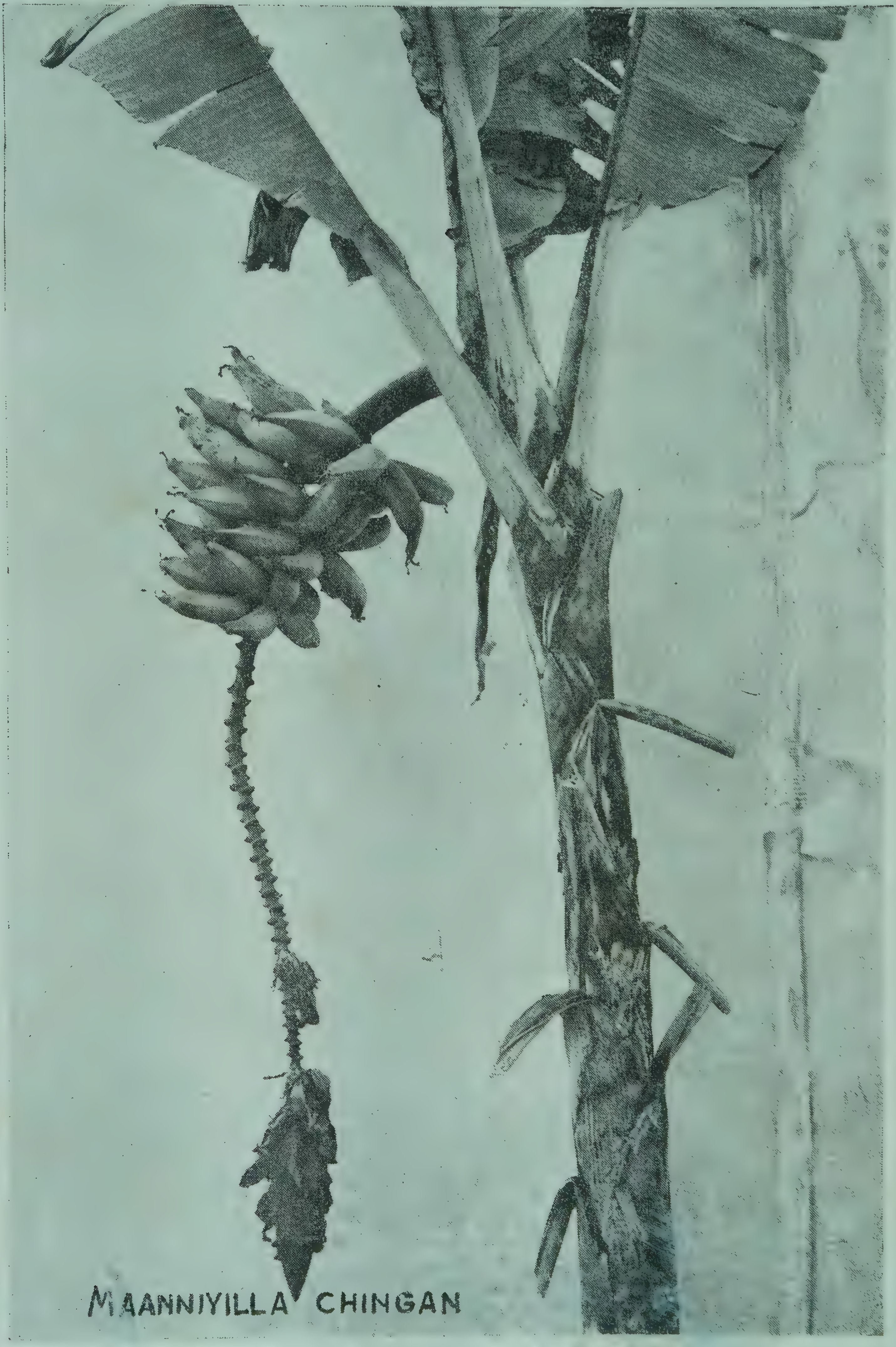
Local names.—Madras (Malayalam) *Chingan, Nachchingan, Pachcha chingan* ; (Kanarese) *Shinga bale.*

It is a medium-sized plant, rather slender, requiring much attention. It is confined to the West Coast of the Madras province. The withered bracts and flowers adhere to the axis throughout. The fruits which are 6 to 7 inches long, remain green in colour even when ripe. It takes about 13 months to mature from time of planting to harvest stage. Because of the green colour of the ripe fruits and of its rarity it is used generally on festive occasions. Mention is made of this variety in Rheedes' Hortus Malabaricus published in 1686 under the same local name. It is used only as ripe fruits.

Stem light green with large dark blotches, $6\frac{1}{2}$ to $8\frac{1}{2}$ feet high, circumference at base 16 to $21\frac{3}{4}$ inches. Leaves linear oblong, leathery, brittle, polished, light green above, glaucous below ; petiole greenish yellow, glaucous, 11 to 12 inches long ; channel of petiole $\frac{3}{4}$ to 2 inches wide, $\frac{1}{2}$ to 1 inch deep and $3\frac{1}{2}$ to 4 inches in circumference, margin of petiole conspicuous, trurning outside with a dark red line of $\frac{1}{16}$ inch broad ; lamina base unequal, right side shorter by about $1\frac{1}{2}$ inches, truncate, left side narrowly acuminate ; lamina tip, right side truncate, left side $\frac{3}{4}$ of a right angle ; midrib slender, glaucous and light green, margin of lamina with a dark red line ; leaf blade $4\frac{1}{2}$ to $6\frac{3}{4}$ feet long, $1\frac{1}{4}$ to $1\frac{7}{8}$ feet broad in the middle. Shot blade 2, bottom $3\frac{1}{2}$ feet long with the lamina portion 17 inches long and $11\frac{1}{2}$ inches broad, top 22 inches with the lamina portion $1\frac{3}{4}$ by $\frac{1}{2}$ inches, distance between bottom and top ones is 17 inches. Inflorescence, peduncle pubescent, 8 to 10 inches long, position of mature bunch $\frac{1}{2}$ right angle to the stem. It has only female and persistent male flowers. Length of fertile axis 9 to $14\frac{1}{2}$ inches and the persistent staminate portion of the axis is 24 to 37 inches. Bract persistent, outside light purple with greenish yellow tinge, very slightly glaucous and very slightly



CHINGAN



MAANNIYILLA CHINGAN

longitudinally grooved, inside light red with yellowish blotches, narrowed towards apex, 20·8 centimetres long, 10·6 centimetres broad; apex obtuse or rounded. Flower persistent male, 6·7 centimetres long, 4 millimetres broad, 9 millimetres deep. Calyx (perigonium) 4·2 centimetres long, 1·4 centimetre broad; calyx outside and inside dull white, number of lobes 5, 2 very small alternating with 3 fairly large ones, yellowish; keels 2, not prominent. Petals (scale) 2·3 centimetres long, 1·5 centimetres broad, semi-transparent, whitish, number of ridges 3 or 4, there is a transparent appendage to the petal on either side of it running to about the middle from top; apex abruptly acuminate, not prominent, number of ridge one, whitish. Stamens 5, 4·2 centimetres long, white, overtopping the stigma; filament 2·1 centimetres long, white, slightly flat; anther 2·1 centimetres long, whitish; anther valves whitish, pollen present. Pistillode 6·3 centimetres long, style and stigma 3·9 centimetres long, style white, stouter towards base but slender; stigma yellowish, number of lobes 5, not prominent. Ovary persistent, 2·5 centimetres long, light green, 4 to 5-sided, tapering towards base; wrist not prominent, pedicel one to 3¾ inches long, 4 to 5 unequal sided, 4 to 5-ridged, 2 to 3 ridges prominent; hands rather loose, 6 to 8; fingers lax, 11 to 13 in a hand, cylindric with 5 unequal sides, 5-ridged, 2 rather prominent, 5 inches long and 4 inches in circumference, 60 to 100 in a bunch; apex stout, ¾ inch long, 5-unequal sided, 5-ridged, 2 very prominent, perianth and style persistent though dried up. Ripe fruits do not easily drop off from the pedicel; rind when ripe green, medium thick, pulp light cream-coloured, sweet. The fruits have good keeping quality. The bunch weighs 20 to 30 lb. It is not used for culinary purpose.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *chinganiana* Jacob: dissimilis; caro mollis; bracteae desiccatae et flores staminati in tota inflorescentiae axis supra fructuum regionem persistunt. Fructus etsi maturi virides permanent.

MANNIYILLA CHINGAN

Manniyilla chingam.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *chinganicna* Jacob, forma *manniyillachinganiana* Jacob.

Local name.—Madras (Malayalam) *manniyillachingan.*

The habit and the habitat are same as *Chingan.* The taste and flavour of ripe fruits are also same as *Chingan.* This is a sub-variety of *Chingan* having the bracts and male flowers deciduous except towards the extremity of the axis where they are persistent for a length of 4 to 6 inches. The bases of wrists on the naked axis are prominent and ribbed. There is no difference in the fruit characters of this and of the *Chingan* variety. The peduncle is nearly glabrous. It is, therefore, a sport of *Chingan.* The author noticed an interesting phenomenon of a sport in this variety, viz., a normal *Chingan* turning into a *Manniyilla chingan* at Coimbatore in the Banana Experimental Area.

Description of plant, leaf and fruit, same as *Chingan.* Taste and flavour of ripe fruits are also same as *Chingan.*

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *chinganiana* forma *manniyillachinganiana* Jacob : cognata sed ab ea differt, es quod bracteae desiccatae floresque staminati praeter longitudinem 5 ad "heart" demittuntur.

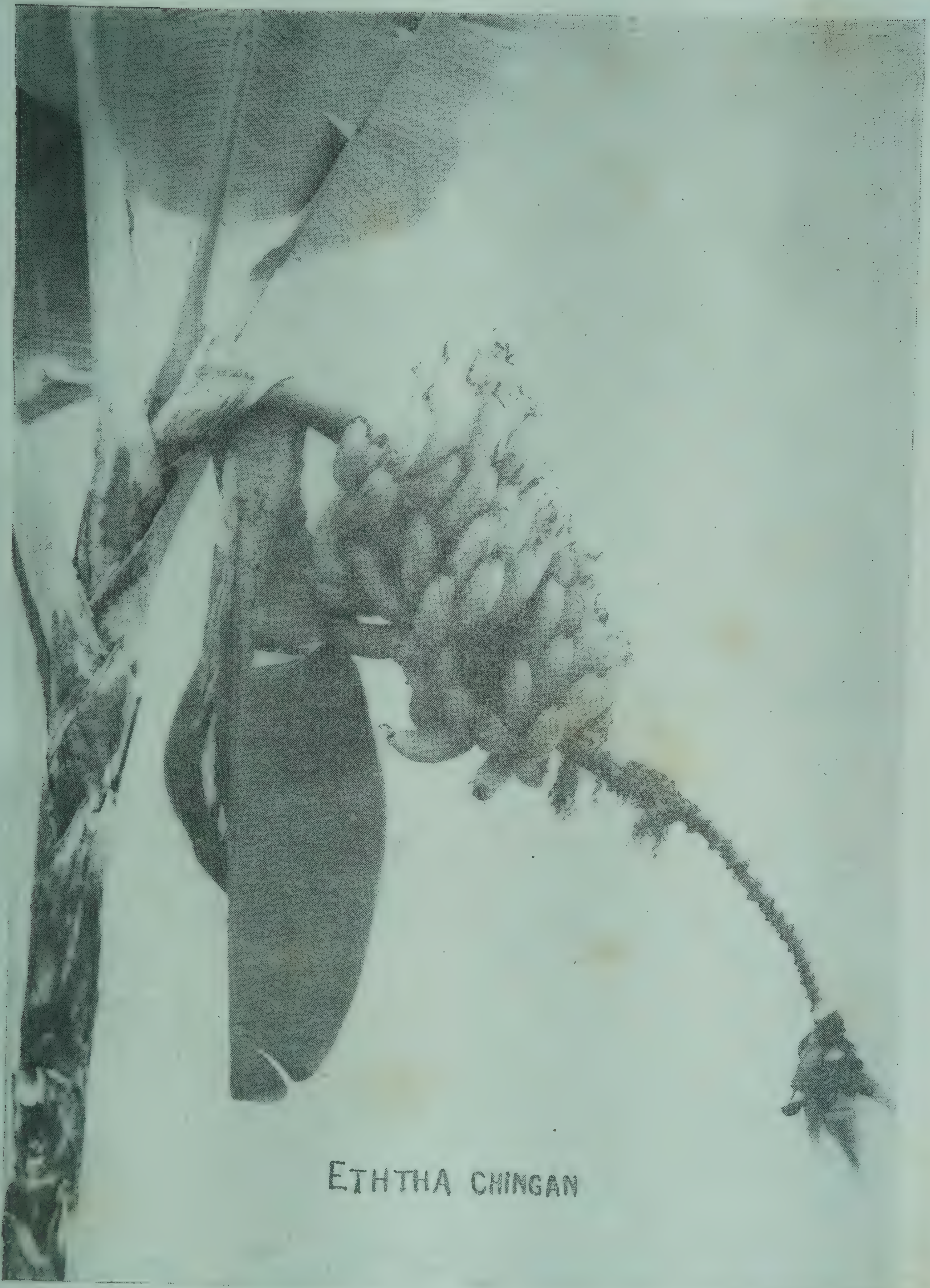
ETHTHA CHINGAN

Eththa chingan.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *eththachinganiana* Jacob.

Local name.—Madras (Malayalam) *Eththa chingan.*

This is a very rare variety of medium size found in stray cultivation at Kozhencherry and the neighbourhood in Central Travancore. The fruits are easily distinguished from *Chingan* by their blunt apices. It takes about 14 months to mature from time of planting to harvest stage. It is a rare variety found in stray cultivation in Central-Travancore. The greenish colour of the ripe fruits and the rarity of the plant lend a special charm to this variety and hence their use on festive occasions. It deserves to be widely grown on account of the large size of bunch and fruit besides the good flavour of the ripe fruit. This is the only variety of banana with white bracts and "heart".

Stem greenish with large dark brown blotches and splashes, 8 feet high, circumference at base 16½ inches. Leaves narrowly oblong ; petiole yellowish green with purplish spots, 11 inches long, 4½ inches in circumference : channel of petiole ⅞ inch deep, one inch wide ; margin of petiole reddish to ⅛ inch broad, but dries up ; lamina 6½ feet long, 22½ inches broad ; lamina base right side short by one inch, truncate, left side broadly acute ; apex of lamina right side truncate, left side 77° ; midrib slender ; shot blades 2, bottom drooping, 27 to 34 inches long, seen outside, lamina portion 17 to 28 inches long, 12 to 13 inches broad ; top (dried) 18½ inches long, lamina portion 1¼ inches long, ¾ inch broad. Inflorescence, peduncle very hairy, 6 to 10 inches long ; the colour of the "heart" is unique in this variety being white and not the common purplish colour. Position of mature bunch ¾ right angle to the stem. It has female, 3 to 8 hands of persistent male and the rest deciduous male flowers ; fertile axis 12 to 15 inches long, sterile



ETHTHA CHINGAN

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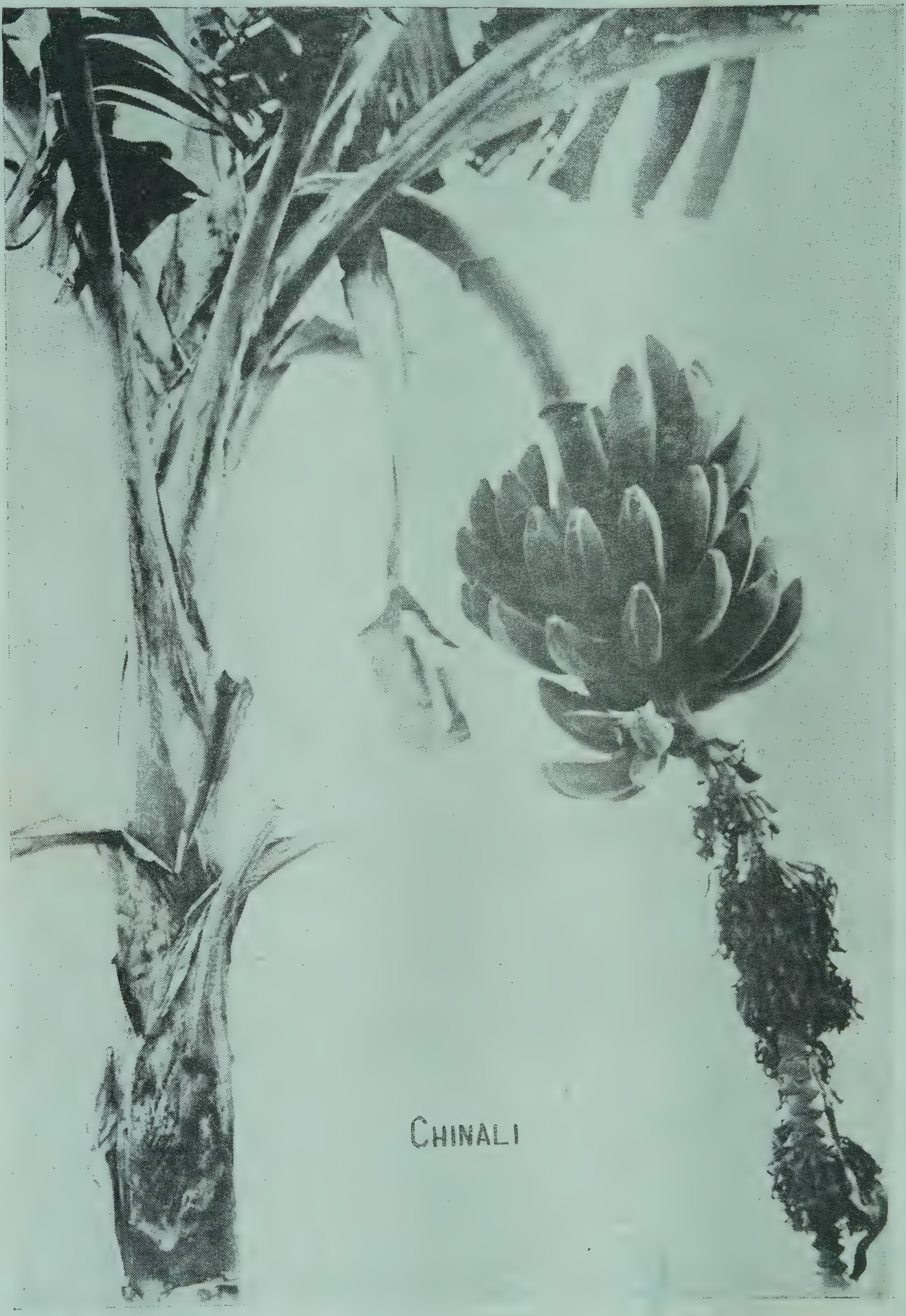


CHINALI

axis 1½ feet long, rather stiff. Bract outside yellowish, light purple to ¼ inch broad towards margin, inside yellowish and reddish towards apex, 13 centimetres long, 8·8 centimetres broad; apex obtuse with a notch. Flower, male 5·3 centimeters long, 3 millimetres broad, 5 millimetres deep. Calyx (perigonium) 3·6 centimetres long, 1·3 centimetre broad, colour of calyx both outside and inside dull white, lobes 5, 3 large alternating with 2 small, keels 2, prominent in the outer series. Petals (scale) 2·1 centimetres long, 1·3 centimetre broad, boat shaped with a bulge outside, ridges 4, apex 2 millimetres long, rather erect; stamens 5, 4·1 centimetres long, filament 3·2 centimetres long; anther 1·6 centimetres long, dark brown; anther valves dark brown; pollen not present. Pistillode 5·1 centimetres long : stigma dark brown; style 3·2 centimetres long, whitish, not prominent. Ovary 1·5 centimetres long, yellowish, tapers towards base. Wrist prominent, ½ inch broad, pedicel ½ inch long, unequally sided, 5-ridged, 2 prominent; hands not very compact, 6 to 7; fingers rather compact, 11 to 13 in a hand, terete with 5 ridges, 2 somewhat prominent, 5½ to 6 inches long, and 4½ inches in circumference, 80 to 90 in a bunch; fruit tapers to apex, base of style accrescent. Ripe fruits do not easily drop off from the pedical, rind when ripe yellowish green, medium thick; pulp whitish in colour, sweet with good flavour and pleasant odour. The fruits have good keeping quality. The bunch weighs 17 to 20 lb. It is not used for culinary purposes.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *eththachinganiana* Jacob : cognata, sed ab ea differt eo quod bracteae desiccatae et flores staminati praeter longitudinem circa 5″ ad apicem demittumtur. Novae bracteae in hac varietate tantum sunt albae.

CHINALI

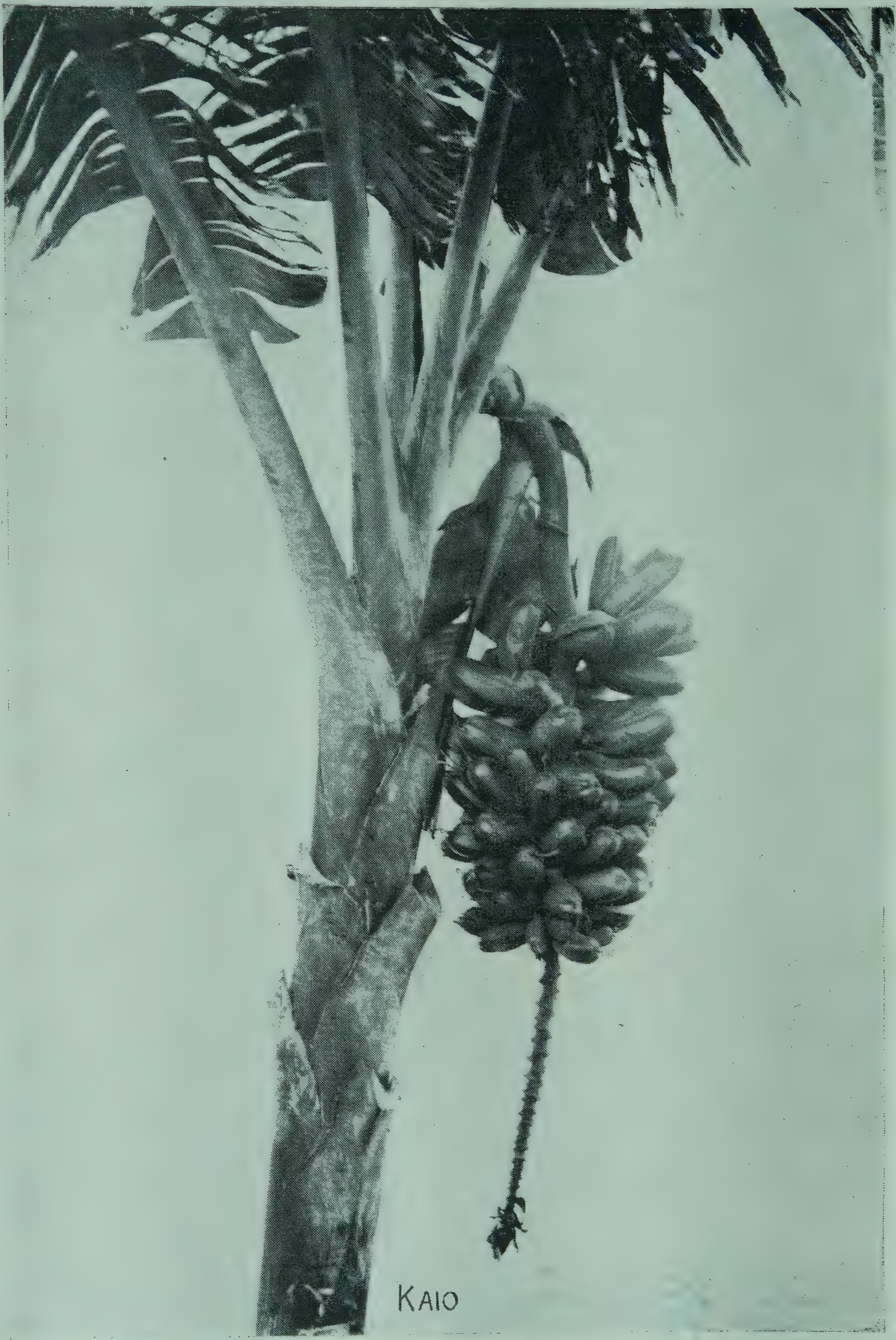
Chinali.—Muse sapidisiaca K. C. Jacob, nom. now. var. *chinaliana* Jacob.

Local names.—Madras (Malayalam) *Chinali, Chinari.*

It is a large plant found in stray cultivation in South Travancore. Most of the withered bracts and some of the withered male flowers drop off in this variety leaving gaps on the axis. The ripe fruit is much in demand; but the unripe in greater use for culinary purpose. It is good for making chips. The plants are very tall and stout. In their original habitat in South Travancore the bunches and fruits are large. They do not thrive well at Coimbatore. The plant is a rare variety and deserves introduction on large scale into other places, especially where there is fairly heavy rainfall so as to enable bananas to grow without irrigation.

Stem greenish yellow with pinkish tinge, 8½ feet high, circumference at base 25 inches. Leaves glaucous below, leathery ; petiole 13 inches long ; channel of petiole one inch wide, $\frac{9}{10}$ inch deep ; margin of petiole deep red to 1/8 inch broad ; lamina 7 feet 4½ inches long, 27 inches broad, lamina base equal, right side narrowly cordate, left side cordate ; apex of lamina right side truncate, left side 77°. Shot blades 3, bottom 53 inches long ; lamina portion 43½ inches long, 21 inches broad ; middle; base alone green, rest dried up, 34 inches long, lamina portion 10 inches long, 10¾ inches broad ; top (dried) 21 inches long, lamina portion 2 inches long, ¾ inch broad ; distance between the bottom and top 5 inches outside and the rest inside the stem. Inflorescence, peduncle very slightly pubescent, 23 inches long, position of mature bunch 45° to the stem. It has female, persistent and deciduous male flowers intermixed, but bracts deciduous ; fertile axis one to 1¼ feet long, persistent and deciduous male portion 2 feet long. Bract outside dark purple, glaucous, inside dark red, 23 centimetres long, 17·1 centimetres broad ; apex with deep and broad sinus, one centimetre long, 2 centimetres broad. Flower persistent and deciduous male intermixed, 8·5 centimetres long, 1·5 centimetres broad, one centimetre deep. Calyx (perigonium) 6 centimetres long, 1·8 centimetres broad, calyx outside cream-coloured, inside cream-coloured with 2 or 3 reddish bands, lobes 5, 3 large alternating with 2 small ones, deep yellow ; keels 2, distinct in the lower row and indistinct in the upper row. Petals (scale) 3 centimetres long, 2·5 centimetres broad, boat shaped, the two sides far apart ; ridges two, prominent ; apex acute, rather erect, 2 millimetres long, cream-coloured. Stamens 5, 5·7 centimetres long, erect ; filament 3 centimetres long, creamy in colour, flat ; anther 3·6 centimetres long, almost straight and bent back towards apex, cream-coloured ; anther valves darkish. Pistillode 7·2 centimetres long, style 5·2 centimetres long, whitish ; stigma yellowish, lobes 5 to 6, indistinct. Ovary persistent and deciduous, 2·7 centimetres long, greenish yellow with purplish blotches near the apex ; 5-unequal sided, bent, tapers to the base. Wrist ½ inch broad in the basal hand, pedicel stout, 5/8 inch long, 5 unequal sided, 5-ridged, all ridges prominent, hands not compact, 5 to 7 ; fingers not compact, up to 12 to 14 in a hand, terete with 5 ridges, 2 ridges prominent ; apex stout, ¼ inch long, 5-unequal sided, 5-ridged, all ridges prominent ; 50 to 70 in a bunch ; ripe fruits do not easily drop off from the pedicel ; rind medium thick, ripening to yellow ; pulp in unripe fruits flesh coloured changing to deeper tinge on ripening, sweet and juicy.

LATIN.—*Musa sapidisiaca* K. C. Jacob, var. *chinaliana* Jacob. Bracteae desiccatae et flores staminati intervallis interposisitis persis-



KAIO

tunt. Caro carneo colore, varietati *plantaniana* Jocob, similis plantae amplore cum largis racemis.

KAIO

Kaio.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *kaiona* Jacob.

Local name.—Kaio (Hawaii)

It is a stout plant of medium height introduced from Hawaii into Coimbatore and distributed after acclimatization to other places. It thrives well here. Young plants of this variety look like *Nendran.* The blotches on the leaves of young *Nendran* plants are found in this variety also. It takes about 15 months to mature from time of planting to harvest stage. It is excellent for culinary purposes, adaptable for making chips. It is of poor suckering quality. The ripe fruits are not tasty.

Stem light to deep red towards the base, yellowish green, tinged with red towards top, 7¾ feet high, circumference at base 26½ inches. Leaves elliptic, very slightly glaucous below, petiole 11 inches long, circumference 5¼ inches, greenish yellow with reddish tinge; midrib thick, reddish, margin of petiole purplish to ¼ inch broad; channel of petiole ¼ inch wide, ¾ inch deep; lamina 6½ feet long, 26½ inches broad, lamina base right side ¼ inch shorter than the left, broadly obtuse, left side auricled, auricle 1½ inches deep, lamina margin purple to ⅛ inch broad; apex of lamina right side truncate, left side 87½°. Bract purple, glaucous; inside dark red; margins purplish; apex broadly obtuse; 10 centimetres long, 6·6 centimetres broad. Florets 13; top florets including the side ones have very faint keels and in the bottom ones the keels are not present. Floret 4·6 centimetres long, 3 millimetres broad, 5 millimetres deep. Perigonium, keels are very faint in the upper series and not found in the lower ones, cream-coloured; margins hyaline; length 3·4 centimetres, width 1·1 centimetre; apex, 3 elongated lobes alternating with two narrow ones at the sinuses; colour of the lobes yellow. Scale cream-coloured and hyaline; apex very minute, one millimetre long, bent outside; ridges 2 or 3, very faint, length of scale 1·6 centimetres, width 1·6 centimetres. Stamens 6, 5 fully developed and one rudimentary, 3·5 centimetres long; filament 1·8 centimetres long, white; anther 1·7 centimetres long, yellowish white with brownish anther valves. Pollen present. Pistillode 4 centimetres long; style 2·9 centimetres long, erect; stigma medium, 4 to 5-unequally lobed, brown, 2 millimetres long; ovary, one centimetre long, creamy white, unequally 3 to 5-sided, tapers to base. Pedicel

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5/8 inch long, 4-unequal sided, 4-ridged, all prominent ; hands rather compact, 6 to 7 ; fingers rather compact, about 12 in a hand, terete with 4 ridges, 3 ridges prominent, $5\frac{1}{4}$ inches long, $6\frac{1}{2}$ inches in circumference ; fruit blunt without any apex, about 60 in a bunch ; ripe fruits do not drop off easily from the pedicel ; rind thick, ripening to yellow ; pulp very soft, loose, juicy and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *kaiona* Jacob : Florum axis rigida. Fructus obtusi sine apice ; caro carneo colore ; olia plantarum novellarum foliis varietatis *plantaniana* Jacob, similia ; caro fructuum maturorum mollissima nihil sapiens, ad wynendum utilis.

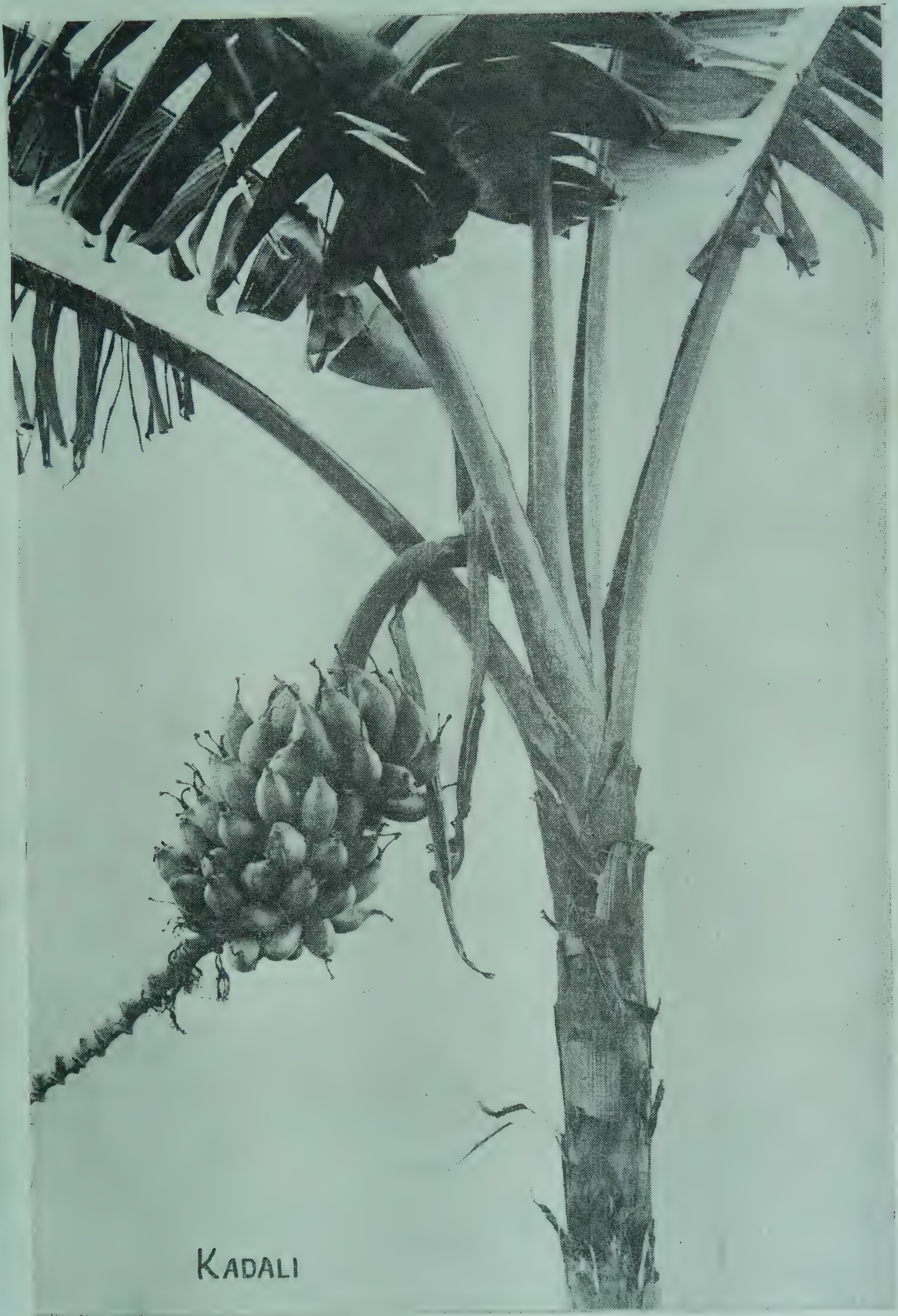
KADALI

Kadali.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *kadaliana* Jacob.

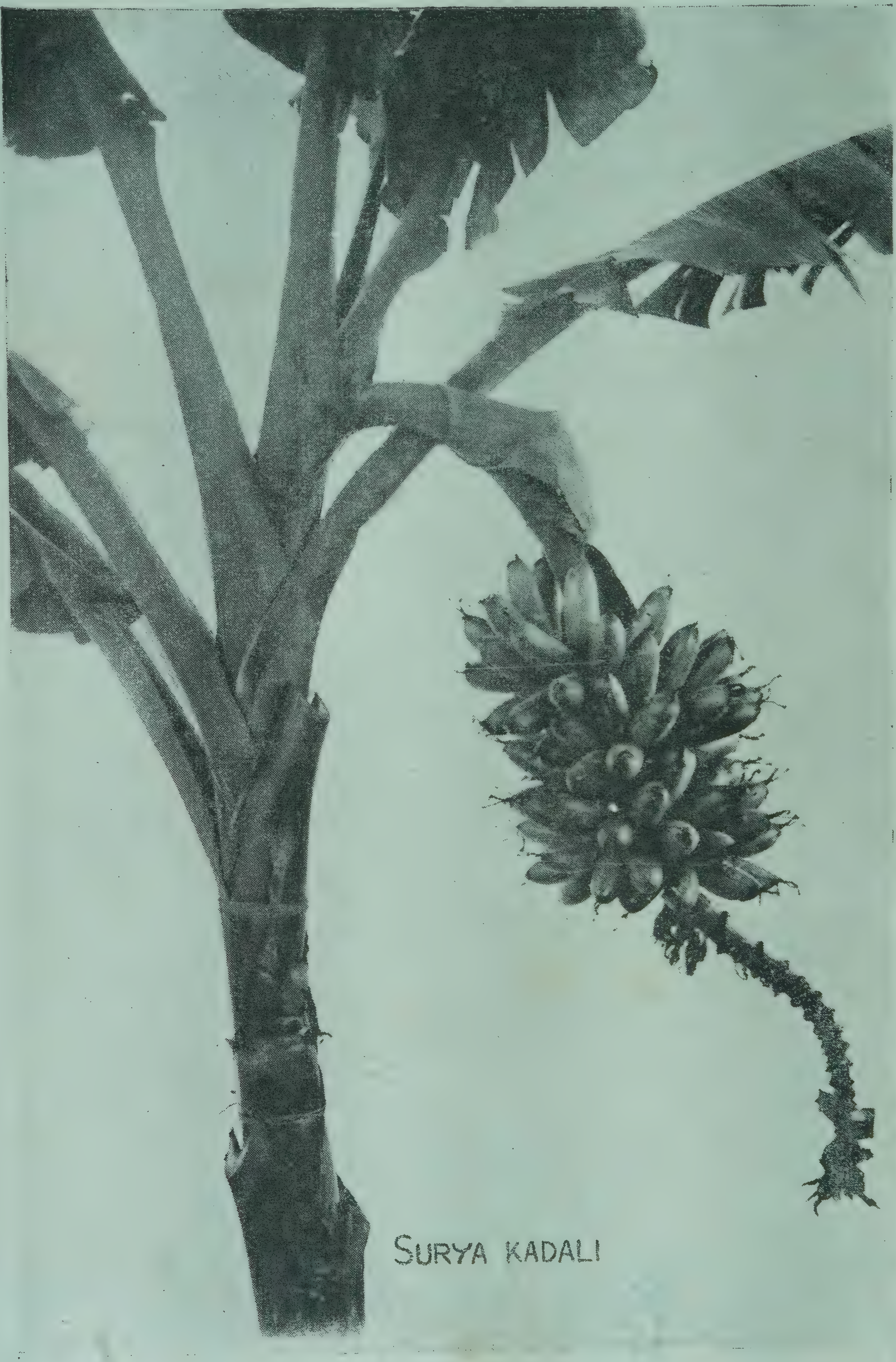
Local names.—Madras (Kanarese) *Ney Kadali* ; (Malayalam) *Devan* or *Devar kadali*, *Kadali*, *Nivedya kadali*, *Poovan kadali*, *Vella kadali.*

It is a small-sized plant found in stray cultivation in the Malabar Coast. It is a very rare variety. The Sanskrit name *Kela* for banana has been derived from the name of this variety—*Kadali.* It takes about 17 months to mature from time of planting to harvest stage. The fruits are largely used for offerings in Hindu temples on the Malabar Coast. In the Hindu temple at Trivandrum *Panchamritham* is made daily out of fruits of this variety. *Panchamritham* is the Indian ambrosia, food of the Gods of this country, delightful to taste and a compound of five ingredients, as the name signifies. Banana pulp is one of them along with honey, sugarcandy and spices. *Pazha prathaman* is made of dried fruits of this variety of banana or of *Nendran*, mixed with rice, sugar and milk is very popular with the aristocracy of Malabar. Since the bunches and fruits are very small, this plant is not largely grown nor is it considered an economic product.

Stem yellowish green, 9 to 10 feet high, circumference at base 22 inches. Leaves linear oblong, smooth and slightly glaucous below ; petiole 22 inches long, circumference $4\frac{1}{2}$ inches, margin of petiole dark red to 1/12 inch broad ; channel of petiole 5/8 inch broad, $\frac{3}{4}$ inch deep ; lamina 7 feet long, 2 feet broad ; right side truncate, left side 70° and rounded ; number of leaves 42 with a monthly average emergence of 4. Shot blades 2, bottom 34 inches long, lamina portion 21 inches long, 15 inches broad ; top one $22\frac{1}{2}$ inches long, lamina portion $3\frac{1}{2}$ inches long, $1\frac{1}{4}$ inch broad ; distance between the two shot blades 10 inches. Inflorescence,



Kadali



SURYA KADALI

peduncle very hairy, 9 inches long, slender, position of mature bunch 85° to the stem; it has female, often a few hands of persistent male and deciduous male flowers; fertile axis 9 to 12 inches long, sterile axis stiff, 2 feet long; bases of wrists very prominent and ribbed. Bract outside light purple, slightly glaucous, inside light mauve, margins dark red, 17·2 centimetres long, 10 centimetres broad; apex rounded with a short notch. Flower, first 3 or 4 hands often have persistent male and then deciduous male; 6·2 centimetres long, 0·3 centimetre broad, 0·4 centimetre deep. Calyx (perigonium) 4·3 centimetres long, 1·7 centimetres broad; calyx inside white with darkish blotch in the centre; calyx outside creamy white with darkish blotch in the basal half; lobes 5, 3 fairly large alternating with two small ones, whitish with an yellowish tinge; keels two, prominent in the outer row. Petals (scale) 2 centimetres long, 1·7 centimetres broad, the two sides erect, semi-transparent; ridges two, not very prominent; apex pointed and erect with one ridge. Stamens 5, sometimes with a sixth one half the length of normal stamens, 4·2 centimetres long, with a bent at the junction of the filament and anther; filament 2·3 centimetres long, white with greyish marks, flat, not straight; anther 1·9 centimetres long, bent, tip also bent backwards, white; anther valves dark. Pistillode 6·2 centimetres long, style and stigma 4·1 centimetres long, style white; stigma yellowish, lobes 3. Ovary often persistent in 3 or 4 hands and then deciduous, 2 centimetres long, whitish, 5-sided, gradually tapering to base. Wrist up to ½ inch broad towards the base, pedicel ⅓ inch long, terete with 5 ridges, 2 ridges prominent; hands 5 to 7, compact, fingers 12 to 15 in a hand. Fruits terete, small, 3 inches long, circumference 3½ inches, 3 or 4-ridged, 2 ridges rather prominent; fruit tapers to apex; apex ¼ inch long, nearly terete with 3 to 4 ridges, 2 to 3 prominent; base of style accrescent; 60 to 120 in a bunch; rind very thin often as thin as paper, yellow when ripe; pulp juicy, very sweet with excellent flavour, deep creamy in colour.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *kadaliana* Jacob. Plantae minutae; longae durationis varietas in qua fructus post annum et dimidium a tempore sationis maturitatem attingunt; inflorescentiae axis rigida; pedunculus pilosissimus; fructus parve, rotundi, style base accrescente.

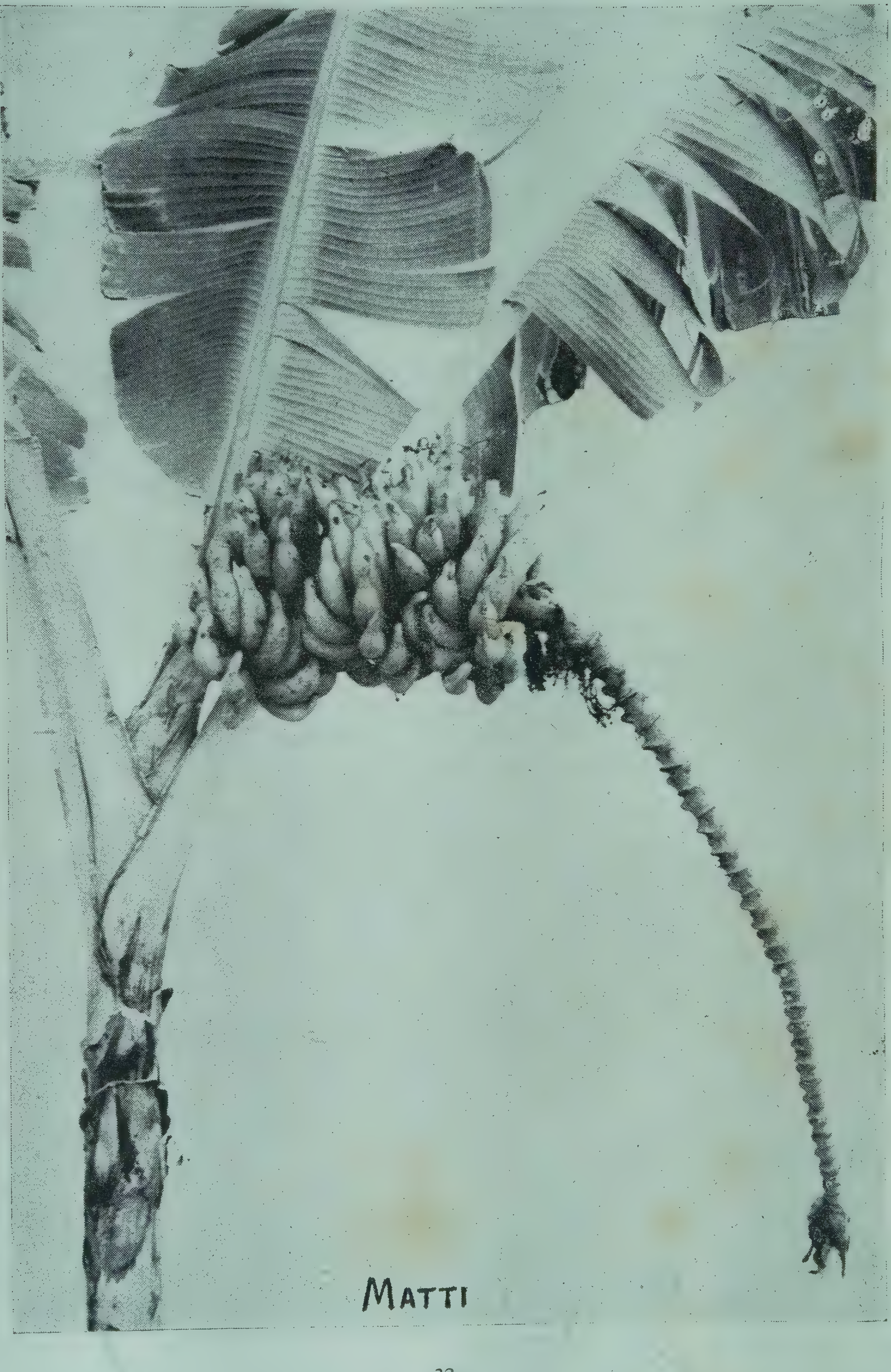
SURYA KADALI

Surya Kadali—Musa sapidisiaca K. C. Jacob, nom. nov. var. *suryakadaliana* Jacob.

Local names.—Madras (Malayalam) *Surya kadali*, *Australian*; Siam—*Klui ferong* or *kai*; Malay—*Pisang maas.*

It is a small-sized plant of recent introduction and grown in 2 or 3 places on the Malabar Coast. It has greenish yellow leaves giving thereby the name *Surya kadali* by which it is called on the Malabar Coast. It takes about 14 months to mature from time of planting to harvest stage. This is the famous banana variety known as *Maas* in Malaya. This variety does not thrive well in South India. The people of Malaya have a special predilection for the ripe fruits of this variety. The smallness of the bunches and fruits of this variety has stood in the way of its growth in this country being considered uneonomic.

Stem greenish yellow but exposed portions reddish, with brown blotches near base of petiole, 6 feet high, circumference at base $16\frac{1}{2}$ inches. Leaves narrowly elliptic, shining and polished on both surfaces, glabrous; petiole 14 to 15 inches long, circumference $4\frac{1}{4}$ inches, margin of petiole dark red to 1/8 inch broad; channel of petiole $\frac{3}{4}$ inch broad, $\frac{3}{4}$ inch deep; lamina $5\frac{1}{2}$ feet long, 20 inches broad, right side $\frac{1}{4}$ inch shorter than the left, obtuse, left side narrowly acute; apex right side truncate, left side 80°; number of leaves 35 with an average monthly emergence of 3. Inflorescence, peduncle slightly pubescent up to one foot long, slender, position of mature bunch more than $\frac{3}{4}$ right angle; it has female and deciduous male flowers only, often a few dried bracts persisting on the rhachis here and there, fertile axis 6 to 9 inches long, deciduous male axis $1\frac{1}{2}$ foot long, bases of wrists prominent, rather stiff. Bract reddish brown, slightly glaucous outside, inside greenish yellow with reddish blotches, ovate acute; apex acute, 15 centimetres long, 10·7 centimetres broad. Flower deciduous male, 6 centimetres long, 4 millimetres broad, 1·1 centimetre deep. Calyx (perigonium) 4·5 centimetres long, 1·6 centimetres broad; keels 2, fairly prominent, concave; outside dull white, inside whitish; lobes 5, 2 small and 3 large, whitish. Petal (scale) whitish, transparent, 2·5 centimetres long, 2 centimetres wide, 2 to 3 deep ridges near apex: apex acuminate. Stamens 5, whitish, 4·5 centimetres long; filament 2·5 centimetres long, whitish; valves of anther dark red; anthers much overtopping the stigma. Pistillode (including stigma) 0·6 centimetre long; style 2·5 centimetres long, white, slightly thickened and yellowish towards stigma; stigma yellowish, 4 to 5-lobed. Ovary sometimes persistent male in 3 or 4 hands and then deciduous male, yellowish green, 4 to 5-sided, 1·6 centimetres long. Pedicel $\frac{1}{4}$ inch long, terete with 5 ridges, 2 ridges prominent; hands 4 to 5, lax, fruits 10 to 14 in a hand; fruits



MATTI

terete, 3½ inches long, circumference 4¼ inches with 5 inconspicuous ridges, one slightly prominent; fruit tapers to apex; apex ⅛ inch long; style persisting; 30 to 50 in a bunch; rind very thin as in *Kadali*, golden yellow when ripe; pulp juicy, very sweet with excellent flavour, deep cream-coloured.

LATIN.—*Musa sapidisiaca* K. C. Jacob, var. *suryakadaliana* Jacob. Plantae minutae, folia viridi flavo colore, nitentia et perpoliata; axis inflorescentiae supra fructumn regionem semi regida; fructus maturi aurco flavo colore, sine apice distincto, dulcissimo sapore landato; pellis papyri pinguitudine.

MATTI

Matti.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *mattiana* Jacob.

Local name.—Madras (Malayalam) *Matti.*

It is a medium-sized plant with yellowish green leaves. It takes about 15 months to mature from time of planting to harvest stage. It is a rare variety grown only in the hills of South Travancore near Nagercoil. Because of the delicious nature of the pulp it deserves to be grown in similar localities. It thrives well at Coimbatore under irrigation. The fruit has long and slender apex.

Stem yellowish green with dark purple and long blotches, 8 feet high; circumference at base 22 inches. Leaves greenish yellow like those of *Surya kadali*, glabrous throughout; petiole 13½ inches long, circumference 4½ inches, greenish yellow; channel of petiole ⅞ inch deep, ½ inch wide, margin of petiole, left side broader; purplish to ⅛ inch broad but dries up, lamina 6½ feet long, 22¼ inches broad; lamina base right side 1½ inches shorter than the left, truncate; left side acuminate to abruptly acuminate; apex of lamina right side truncate, left side 85½°. Shot blades two, bottom 24 to 34 inches long (seen outside), lamina portion 17 to 30 inches long, 11 to 15 inches broad; top (dried) 21 inches long, lamina portion 2 inches long, one inch broad. Inflorescence, peduncle pubescent, very short, 4 to 5 inches long, 5½ inches in circumference; position of mature bunch 95° to the stem. It has female, and deciduous male flowers only; fertile axis one foot long; sterile axis 2 feet long, rather stiff. Bract outside dark purple, glaucous, inside dark red, 15·5 centimetres long, 9 centimetres broad; apex rounded with a notch. Flowers, male, all bent at the junction of the ovary to one side, 5·2 centimetres long, 3 millimetres broad, 6 millimetres deep. Calyx (perigonium) 3·6 centimetres long, 1·4 centimetres broad, calyx dull white both outside and inside; number of lobes 5, 3 large alternating with 2 small, light cream-coloured in colour; keels 2, prominent in the outer series. Petals (scale) 1·3 centimetre long, 1·4 centimetre broad, bowl-shaped; ridge one; apex a minute projection. Stamens 5, 3·1 centimetres long; filament 1·5 centimetres long, white, flat; anther 1·6 centimetres long; anther valves brown. Pistillode 1·6 centimetres long, slender, whitish; stigma 3 millimetres long, deep yellow; style 3·2 centimetres long, whitish. Ovary 1·6 centimetres long, tapers to base. Wrist ⅓ inch broad; pedicel ¼ inch long, 5 unequal sided, 2 sides being very broad, 5 ridged; hands 8 to 10, fruits 14 to 16 in a hand, compact, 3½ inches long, 3¼ inches in circumference, terete, 5-ridged, apex very distinct, ¾ inch long, nearly terete, 3 to 4-ridged, base of style persistent to ⅙ inch long; 150 in a bunch; fruits do not easily drop off from the pedicel; rind when ripe golden yellow, rather thin; pulp juicy, very sweet with good flavour and strong odour, deep cream-coloured; the bunch weighs 9 to 15 lb. Unripe fruits are not used for culinary purpose.

LATIN.—*Musa sapidisiaca* K. C. Jacob, var. *mattiana* Jacob. Folia flavescenti viridi colore; latus dextcrum ad basim laminae 1½ inches brevius; pedunculus brevissimus, 4 inches to 5 inches longus, pubescens; florum axis supra fructuum regionem fere rigida; fructus parvus cum apice prominenti ¾ foot longo. Caro dulcissima sapore landato et odore forte.

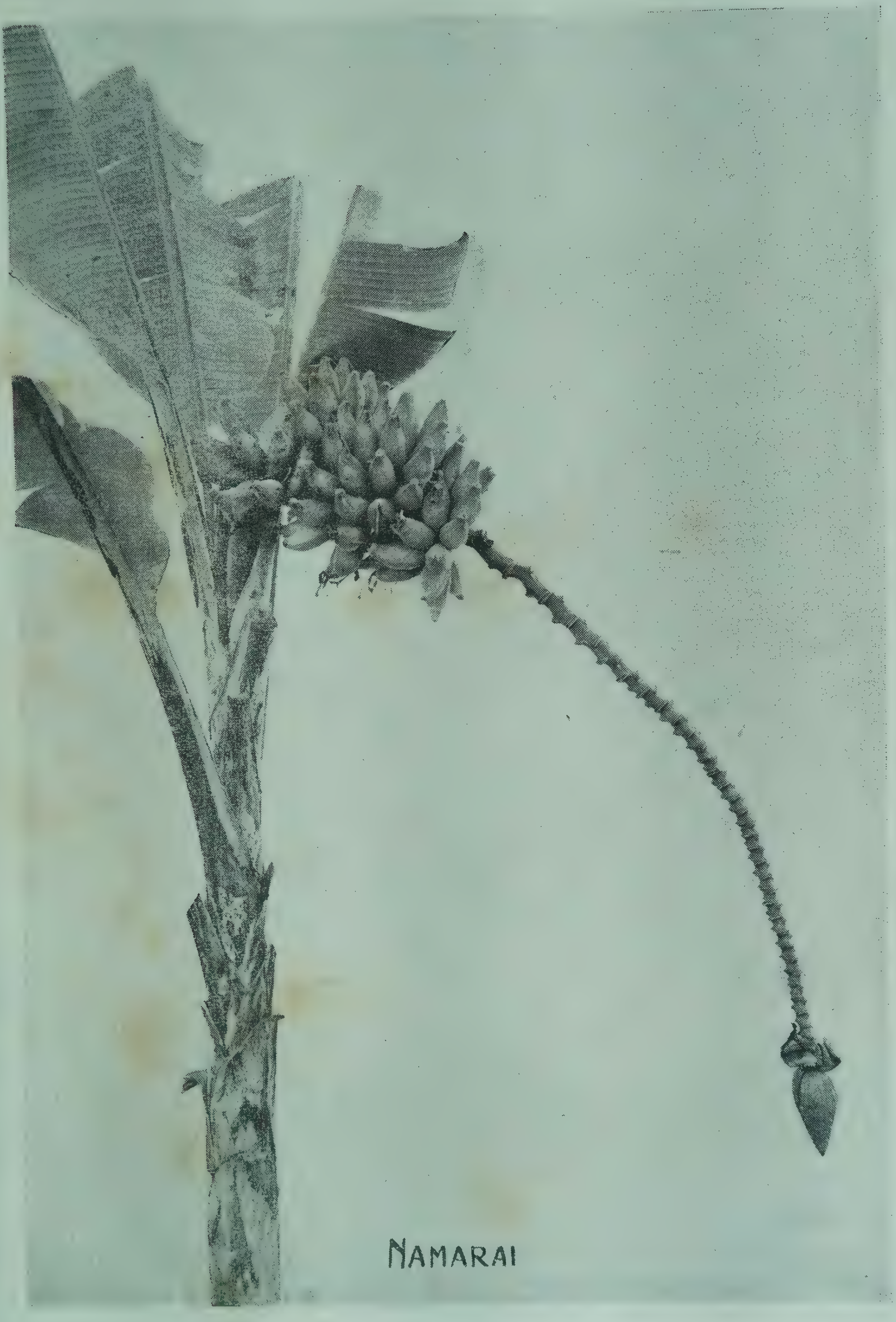
NAMARAI

Namarai.—Musa sapidisiaca K. C. Jacob nom. nov. var. *namaraiana* Jacob.

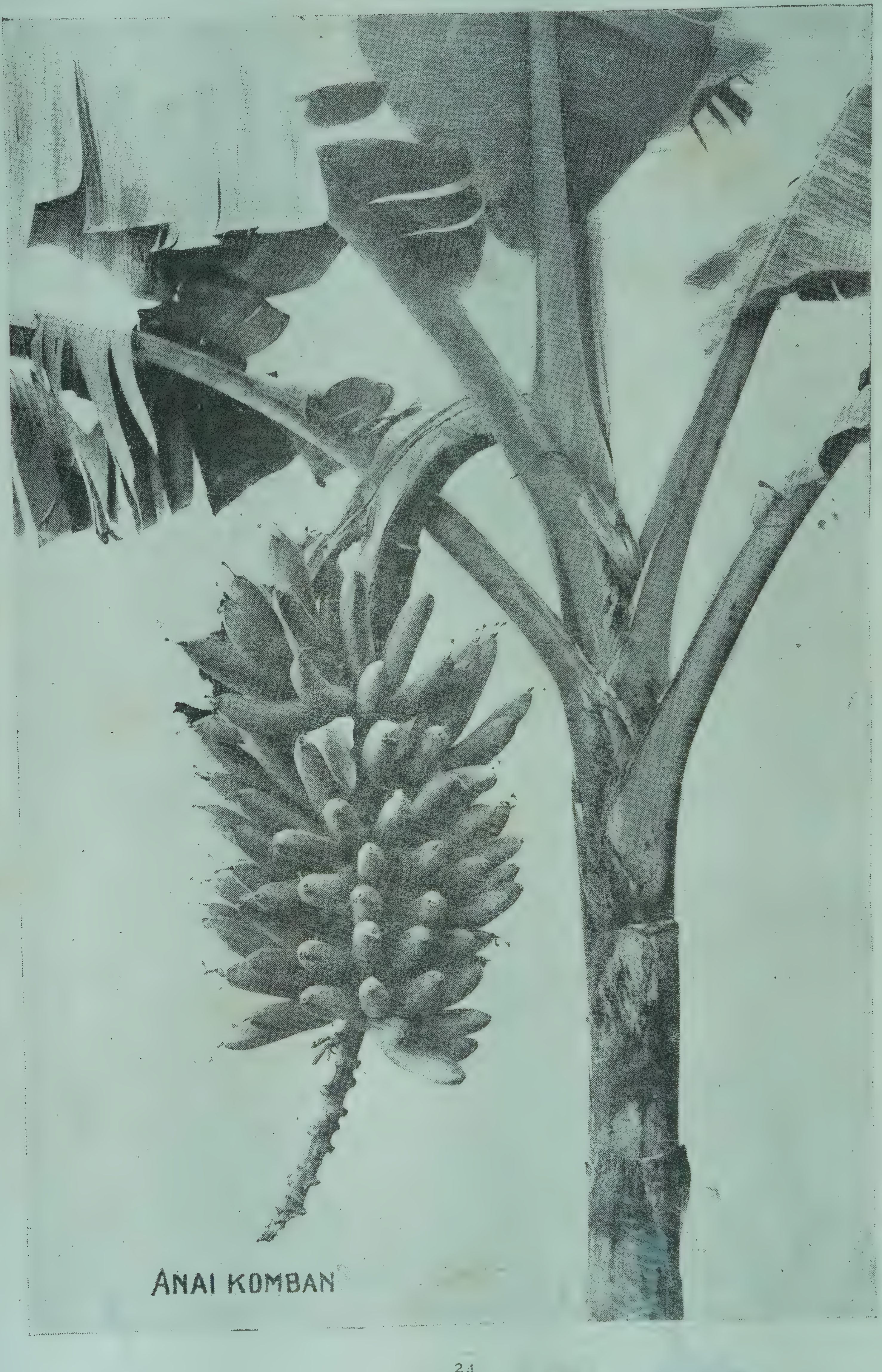
Local name.—Madras (Tamil) *Namarai.*

It is a small and slender plant grown as scattered units along with other banana varieties in the Pulney and Sirumalai Hills of the Madurai district. The stalk of the bunch of fruits is very short. It takes about 13 months to mature from time of planting to harvest stage. Stray plants of this variety are grown in the hills of the Madurai district along with the hill bananas, viz., *Virupakshi* and *Sirumalai.* It thrives well at Coimbatore and produces here larger bunches than in its natural habitat. The fruits are small in size and the whole bunch often weighs about 5 lb. It is not considered an economic variety.

Stem yellowish, 7½ feet high, circumference at base 13 to 14 inches. Leaves linear light green polished; petiole one foot long, margin of petiole red tinged to ⅙ inch broad; channel of petiole ¾ inch broad, ¾ inch deep; lamina 5¼ feet long, 1½ feet broad, lamina



NAMARAI



ANAI KOMBAN

base right side 1½ inches shorter than the left, obtuse; left side broadly acute; apex of lamina right side truncate, left side 80 degrees; number of leaves 33 with an average monthly emergence of 4. Shot blades 2, bottom 22 inches long, lamina portion 14 inches long, 6 inches broad; top 17 inches long, lamina portion 2 inches long, ¾ inch broad; distance between the two shot blades 8¼ inches. Inflorescence, peduncle hairy, 8 inches long, position of mature bunch 85° to the stem; it has female and deciduous male flowers only; fertile axis ¾ to one foot long, deciduous male portion of axis about 2 feet long, not pendulous but almost in a straight line with the axis. Bract outside light purple, slightly glaucous, inside pale violet with transverse narrow ridges specially in the middle, basal portion yellowish, ovate, rounded, 12·2 centimetres long, 10·2 centimetres broad, apex rounded. Flower deciduous male, 4·8 centimetres long, ·3 centimetre broad, ·9 centimetre deep. Calyx (perigonium) 3·5 centimetres long, 1·1 centimetre broad; margin hyaline; calyx outside cream-coloured, inside light cream-coloured; lobes 5, 2 smaller alternating with 3 larger, yellowish; keels 2, prominent. Petals (scale) 2·5 centimetres long, 1·5 centimetres broad, narrowly boat shaped, dull white; ridges 1 to 3, 2 being common, not prominent; apex acute or acuminate, erect with a ridge on the apex, creamy in colour. Stamens 5, 4 centimetres long, much longer than the perigonium and overtopping the stigma; filament 2·5 centimetres long, white, slightly flat; anther 1·4 centimetre long, whitish; anther valves grey. Pistillode 3·5 centimetres long; style 3·2 centimetres long, white, rather slender; stigma yellowish brown; lobes rather small. Ovary deciduous, 1·4 centimetre long, greenish white, 5–unequal sided with 2 sharp sides. Pedicel ¼ inch long, 5–unequal sided, 5–ridged, 3 ridges prominent; hands 5 to 9, fruits 12 to 16 in a hand, 3 inches long, circumference 3¼ inches, terete, 5–ridged, 2 ridges prominent, fruit tapers to apex, apex ⅛ inch long, 2 sided and terete; ridges 5, 2 prominent, base of style persisting; 70 to 80 in a bunch, fruits do not easily drop off from the pedicel; rind when ripe dull yellow, medium thick, pulp juicy, sweet and with good flavour.

LATIN.—*Musa sapidisiaca* K. C. Jacob, var. *namaraiana* Jacob. Truncus brevis, tenuis; ad basim laminae latus dextcrum sinistro 1½ inches brevius; pedunculus fere nullus; florum axis supra fructuum regionem rigida; wrists of hand prominentia. Fructus brevissimi 3 inches longi.

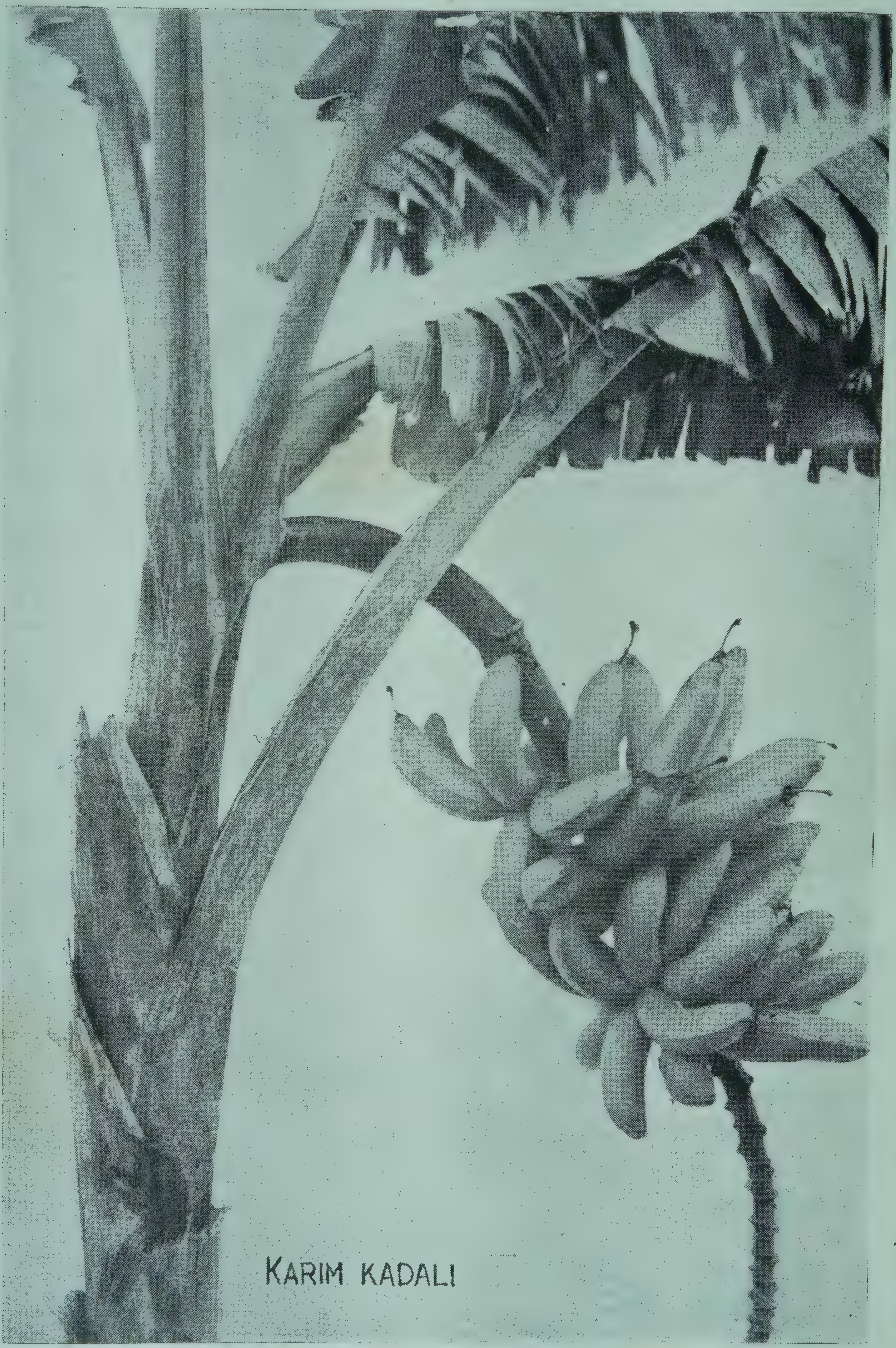
ANAIKOMBAN

Aanaikomban.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *anaikombaniana* Jacob.

Local names.—Madras (Tamil) *Aanaikomban, Aattukomban, Kadali* (Ramnad), *Pachcha naadan* (Sendamaram in Tirunelveli district); *Pachcha vazhai* (Malli in Tirunelveli district); (Telugu) *Komma aratti*; (Kanarese) *Haavu bale, Kombu bale, Madras bala, Naga bale*; (Hind.) *Hathai Kela, Moon gin sing*; Orissa—*Mohan bansi.*

It is a medium-sized plant found in stray cultivation throughout the Madras province except on the Malabar Coast of the Madras province. It takes about 13½ months to mature from time of planting to harvest stage. It is not largely grown anywhere as pure stand. It thrives well in cool mountainous places like the slopes of the Nilgiris and the hills of the Agency tracts of the Northern Circars. The colour of the rind of the fruits produced in such places remains green even when ripe. The local names of this variety which mention it as tusk of the elephant or horn of the sheep, etc., suggest the length and the slender aspect of the fruit.

Stem yellowish green with large dark blotches, 13½ feet high, circumference at base 33 inches. Leaves elliptic oblong, deep green; petiole short, stout, 9 inches long, circumference 7½ inches, margin bent back, dark red to ⅕ inch broad; channel of petiole 2¼ inches broad, 1¼ inch deep; lamina 7 feet long, 29 inches broad, lamina base right side ⅝ inch shorter than the left, obtuse, left side narrowly acute; apex of lamina right side truncate, left side more than ¾ right angle; number of leaves 33, with an average monthly emergence of 3 to 4. Shot blades 2, bottom 54 inches long, lamina portion 42 inches long, 20½ inches broad; top 32 inches long, lamina portion 9½ inches long, 6 inches broad; distance between the 2 shot blades 8½ inches. Inflorescence, peduncle hairy, 14 inches long, position of mature bunch 45° to the stem; it has female and deciduous male flowers only; fertile axis 16 to 18 inches long; deciduous male portion about 2 feet long. Bract outside light purple, slightly glaucous, inside cream-coloured towards base and pinkish towards apex; 17·5 centimetres long, 10 centimetres broad; apex rounded. Flower, deciduous male, 5·8 centimetres long, 4 millimetres broad, one centimetre deep. Calyx (perigonium) 3·8 centimetres long, 1·5 centimetres broad, colour outside and inside dull white; lobes 5, 3 very prominent, alternating with 2 very small ones, slightly yellowish; keels 2, prominent in the lower series and less prominent in the upper series. Petals (scale) 2·1 centimetres long, 2 centimetres broad bowl shaped, transparent, the 2 sides erect; ridge one, whitish, prominent; apex acuminate, erect, ridge one. Stamens 5, 4·5 centimetres long, overtopping the perigonium and stigma; filament 2·5 centimetres long, white,



KARIM KADALI

straight, slightly flat; anther 2 centimeters long, apex slightly bent back, white, anther valves brownish; pollen present. Pistillode 5·1 centimetres long, style and stigma 3·5 centimetres long, whitish below and yellowish towards apex; stigma lobes indistinct, not prominent, much shorter than anthers, yellowish. Ovary deciduous, 1·6 centimetres long, whitish, unequally 5-sided, tapering to base; slightly bent and stout in the lower series, more upright and longer by 2 millimetres in the upper series. Pedicel ½ inch long, 5-unequal sided, 5-ridged, 3 ridges prominent; hands 6 to 8; fruits up to 16 to 21 in a hand, 7 to 8 inches long, circumference 4 to 5 inches, terete, 5-ridged, 3 ridges rather prominent; fruit tapers to apex, apex not distinct, base of style persisting; 80 to 120 in a bunch, rind generally yellowish when ripe but in higher elevations and cooler climates yellowish green; medium thick; pulp juicy, sweet.

LATIN.—*Musa sapidisiaca* K. C. Jacob, var. *annaikombaniana* Jacob. Pedunculus pilosus; fructus 6 to 8 inches longi sine apice distincto; pellis fructuum in lacis planis crescentium flavescente colore, in altis regionibus viridi colore.

KARIM KADALI

Karim kadali.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *karimkadaliana* Jacob.

Local names.—Madras (Tamil) *Aanai komban* (Kulittalai in Tiruchirappalli district); (Kanarese) *Yerchi bale*; (Malayalam) *Chodari*, *Irachchi kai*, *Irachchi ketti kai*, *Karim kadali*, *Kari vazha*, *Vettan.*

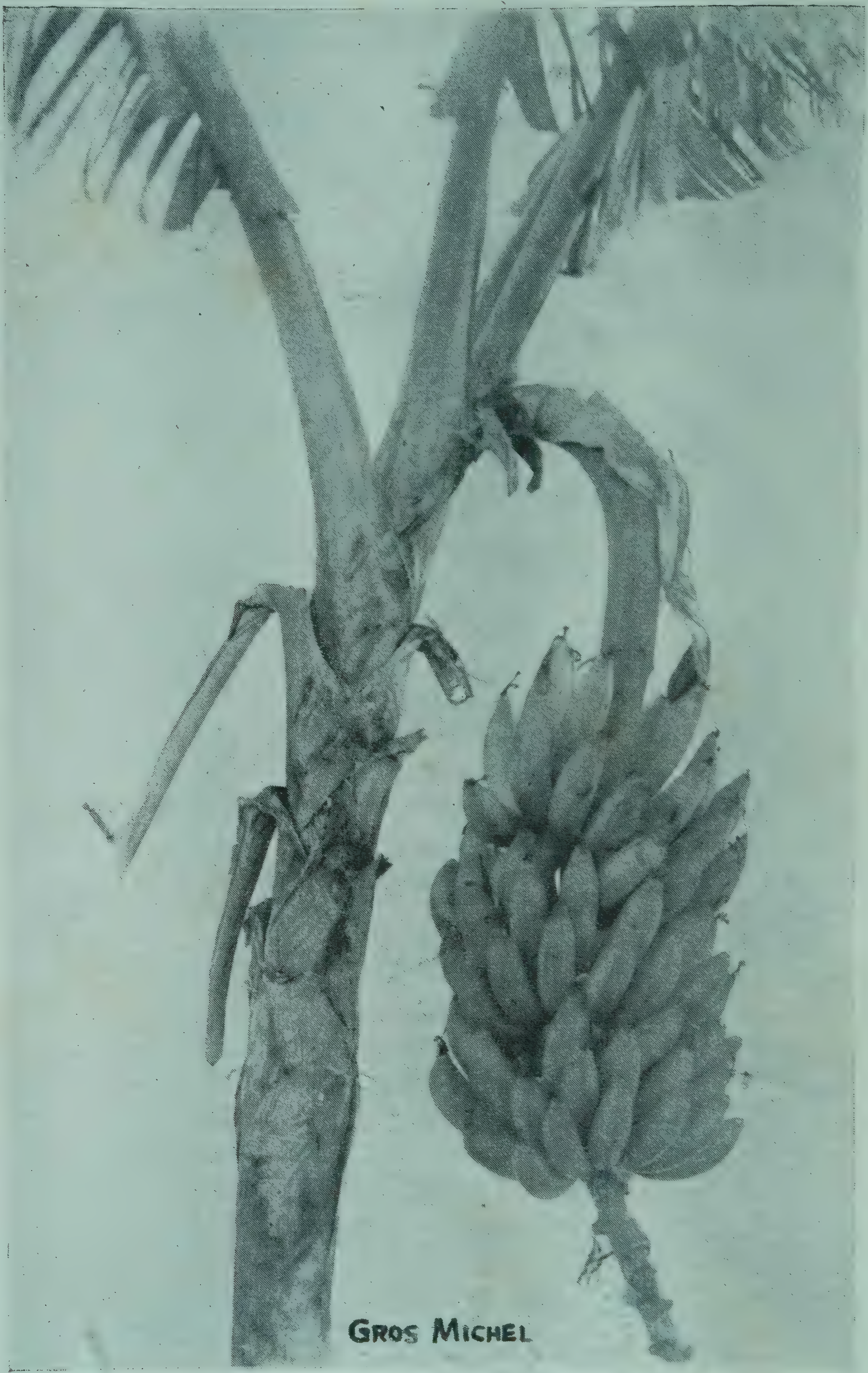
It is a large-sized plant found in stray cultivation on the Malabar Coast. This variety does not occur anywhere outside the Malabar Coast, while *Aanai komban* is found everywhere except on the Malabar Coast. Both have long fruits but are different in all other respects. The right side of the base of the leaf blade is shorter than the left by 3 to 4 inches. It takes about 14 months to mature from time of planting to harvest stage. It is not grown as pure stand anywhere. The ripe fruits are sometimes steamed before consumption. It is considered a specific for dysentery. The unripe fruits are used for culinary purpose and often cooked with meat in order to soften its tissue. The fruits are subject to "Cigarend" disease.

Stem light pinkish green, 8 feet high, circumference at base 20 inches. Leaves elliptic oblong, smooth, glabrous, leathery; petiole 13 inches long, circumference 4½ inches, yellowish green; channel of petiole ½ inch broad, ¾ inch deep, margin of petiole red to ½ inch broad; lamina 6½ feet long, 25 inches broad, lamina base right side 3¾ inches shorter than the left, truncate; left side broadly acuminate; apex of lamina, right side truncate, left side truncate but ½ inch lower; number of leaves 26 with an average monthly emergence of 3. Shot blades 2, bottom 42½ inches long, the lamina portion 31½ inches long, 18 inches broad; top 23 inches long, the lamina portion 4½ inches long, 3½ inches broad; distance between the 2 shot-blades 10½ inches. Inflorescence, peduncle very pubescent, 18 inches long, position of mature bunch rather drooping, little less than half a right angle; it has female and deciduous male flowers only; fertile axis 1 to 1¼ feet long, deciduous male 2 feet long. Bract dark purple outside, glaucous; inside deep red with transverse corrugations, 20 centimetre long, 13 centimetre broad; apex obtuse, mucronate. Flowers deciduous male, 6·8 centimetres long, 7 millimetres broad, 1·2 millimetre deep. Calyx (perigonium) dull white with grey indistinct spots outside and inside; keels 2, prominent; 5·2 centimetres long, 2·1 centimetres broad, lobes 5, 3 large alternating with 2 small, yellowish. Petals (scale) 2·4 centimetres long, 2·3 centimetres broad, scarious; apex and adjoining part bent inside; ridges 3; apex acute, yellowish. Stamens 5, overtopping style and stigma, 4·9 centimetres long, dull white; filament 2·7 centimetres long, style and stigma 3·7 centimetres long, whitish towards base, white with red spots in the middle, yellowish for about 2 centimetres below stigma, stigma yellowish, with 4 to 5 indistinct lobes. Ovary deciduous, greenish white, 1·5 centimetres long, 4 to 5-unequal sided, 2 ridges prominent, tapers to base; wrist up to ½ inch broad; fruit tapers to pedicel, pedicel ¼ inch long, thick, 5-unequal sided, 5-ridged, 2 ridges prominent; hands rather loose, 6 to 8, fingers rather loose, 10 in a hand, nearly terete, with an indistinct S bent, 5-ridged, 2 ridges very prominent; 6½ inches long, 4½ inches in circumference, about 100 in a bunch; fruit tapers to apex; apex not distinct; style base accrescent to ½ inch long in some fruits; ripe fruits do not easily drop off from the pedicel; rind fairly thick, yellow; pulp cream-coloured, rather tough, sweet.

LATIN.—*Musa sapidisiaca*, K. C. Jacob var. *karimkadaliana* Jacob. Plantae amplae; latus dexterum ad basim laminane sinistro 3½ inch. brevius pedunculus pilosissimus; fructus 6-7 inch. longi, apice indistincto; styli basis accrescens. Caro fructus maturi non mollis; ad manducandum fructus quaeruntur.

GROS MICHEL

Gros Michel.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *grosmicheliana* Jacob.


GROS MICHEL

English names.—Gros Michel, Jamaica banana, Martinique, Figue-la-rosa ; Hawaii—*Bluefield ;* Ceylon—*Anamalu ;* Siam—*Klui-hom ;* Burma—*Thihm we ;* Malaya—*Pisang embon ; Pisang bunga, Pisang hijan, Pisang masak hijan.*

It is a large plant introduced into South India from Trinidad, West Indies, in recent years. This variety when grown at Coimbatore produces bunches of fruits of exportable size of 8 'hands' and more. Instead of trying to evolve a new variety in India fit for export trade, it would be easier to multiply this variety and grow the same extensively for export to foreign countries. It is extensively grown in the West Indies and to some extent in the Eastern countries like Indo-China, Siam and Malaya which are supposed to be its home. Suckers of this were obtained from Trinidad under the name Gros Michel ; and they are being grown successfully at Coimbatore. A variety of banana under the name Bluefield obtained from Honolulu, Hawaii, proved on cultivation at Coimbatore to be the same as this. It thrives well here as well as in all the other places where it has been introduced. The bunches and fruits are large. The fruits bent backward at maturity and thus facilitates easy handling in transport. A well ripe fruit melts in the mouth. It deserves large scale introduction into all parts of India.

Stem yellowish green with dark purple blotches and splashes, 9¼ feet high, circumference at base 26 inches. Leaves slightly glaucous below, leathery ; petiole yellowish green, glaucous, 18 inches long, circumference 7 inches, channel of petiole 1·6 inches wide, 1¼ inch deep ; margin of petiole winged, pinkish to ¼ inch broad ; lamina 8¾ feet long, 30¾ inches broad, lamina base, right side 3 inches shorter than left side, nearly truncate, left side acute or acuminate ; apex of lamina right side truncate, left side 80° ; shot blades 2, bottom 53 inches long, lamina portion 38 inches long, 22 inches broad ; top (dried) 31 inches long, lamina portion 7 inches long, 5¼ inches broad, distance between the two 9 inches outside and the rest inside stem. Inflorescence, peduncle pubescent, 23 inches long, circumference 7¾ inches ; position of mature bunch 20° to the stem, pendulous and nearly parallel to the stem. It has female, 2 to 3 bottom hands persistent male and deciduous male flowers ; fertile axis two feet long, deciduous portion semi-pendulous, bases of wrists very prominent, two feet long. Bract light purple, slightly glaucous ; inside light red ; margins dark purple to ⅙ inch ; apex obtuse ; 15 centimetres long, 8·7 centimetres broad. Florets 5 pairs, 5·7 centimetres long, 6 millimetres broad, 1·1 centimetre deep ; perigonium, keels very prominent in the lower series and visible in the upper series, dull white with scattered brownish spots ;

margins hyaline ; 4·5 centimetres long, 1·7 centimetres broad ; apex with 3 large lobes and with 2 small ones at the sinuses, yellow. Scale white, hyaline ; apex 1 to 1·5 millimetre long, slightly yellowish, erect ; ridges 4 or 5, not prominent ; length of scale 2·3 centimetres long, 1·7 centimetres broad. Stamens 5, 4·7 centimetres long ; filament 2·8 centimetres long, flat, white ; anther 1·9 centimetres long, white with dark brown anther valves. Pollen profusely present. Pistillode 5·5 centimetres long ; style 4·2 centimetres long, erect, rather slender, white ; stigma small, 4 to 5-indistinctly lobed, yellowish. Ovary 1·3 centimetre long, ivory white, unequally 5-sided, the dorsal side broadest, abruptly tapers to base. Pedicel 1/3 to ½ inch long, 5-unequal sided, 5-ridged, all ridges prominent ; hands compact, 7 to 9 ; fingers compact, 12 to 14 in a hand, terete with 5 ridges, 3 ridges rather prominent ; 5½ inches long, 5-inches in circumference, fruit tapers to apex ; apex stout, 5–ridged, all ridges prominent ; about 100 in a bunch. Ripe fruits drop off easily from the pedicel ; rind medium thick, ripening to yellow ; pulp cream-coloured, juicy, very sweet with very good flavour, slightly spicy.

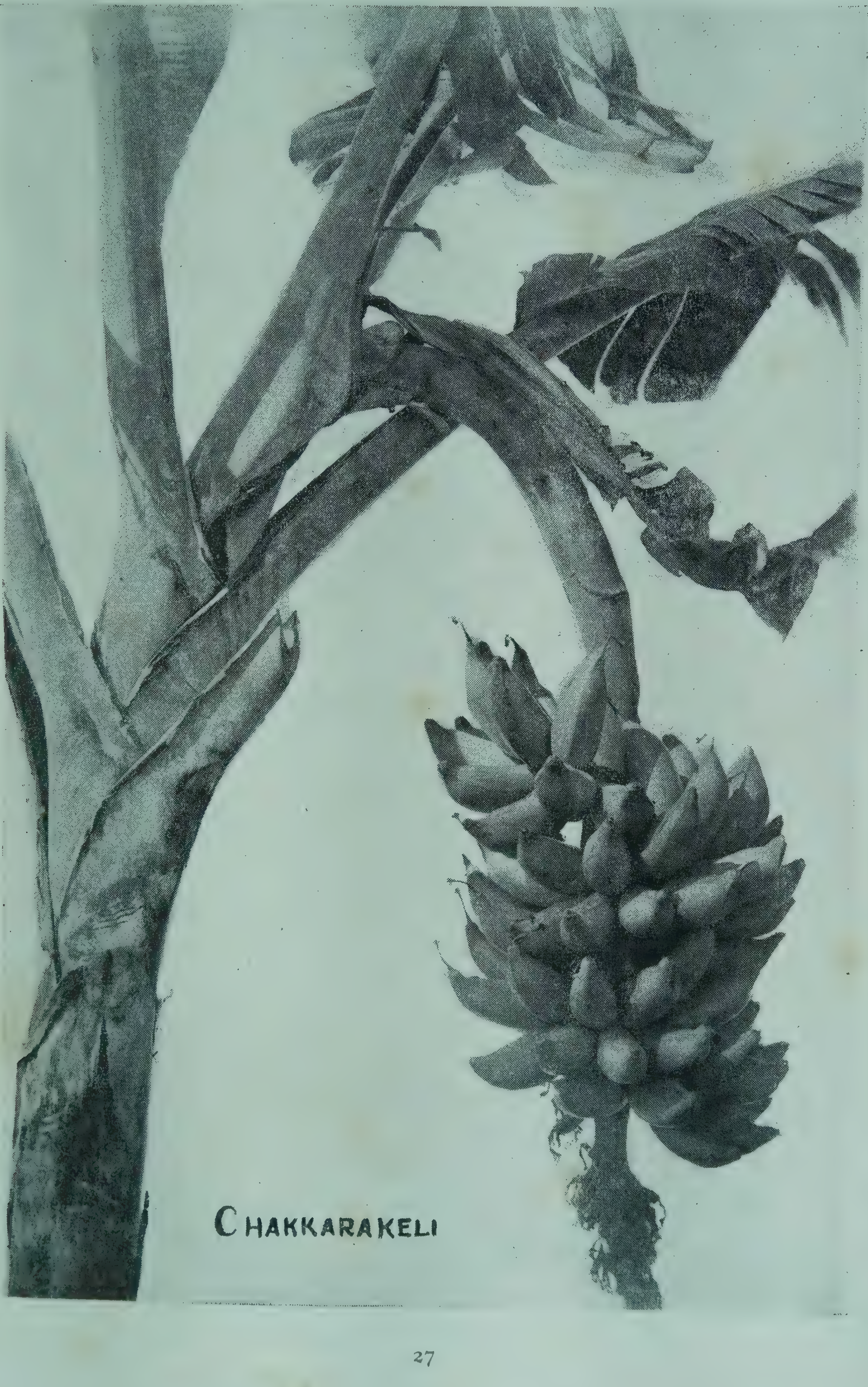
LATIN.—*Musa sapidisiaca*, K. C. Jacob var. *gros micheliana* Jacob. Plantae amplae ; latus dexterum laminae sinistro 3 inches brevius, pedunclus pubescens ; pollen abundonter praesens ; racemi et fructus largi ; fructus 7 inch. longi, complete sursum conversi unde facile in fasciculis colligi possint.

CHAKKARAKELI

Chakkarakeli.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *chakkarakeliana* Jacob.

Local names.—Madras (Tamil) *Raja kili, Kari vazhai* (Tiruchirapalli), *Raja vazhai, Mysore Rasthali, Rasthalai* (Tenkasi in Tirunelveli district), *Thaen kadali* ; (Telugu) *Chakkarakeli, Godavari Chakkarakeli, Manchi Chakkarakeli, Pedda Chakkarakeli, Sajja aratti, Shaja, Thella Chakkarakeli;* (Kanarese) *Aa bale, Raja bale;* (Malayalam) *Chakkarakadali, Ezhuththani, Mysore poovan;* (Mundakayam in Travancore).

It is a medium-sized plant largely cultivated in the Godavari district. This variety can easily be made out from the other varieties of bananas by the upturned margins of the bases of leaf stalk. These margins have further a bright red border ¼ inch wide. The whitish green colour of the unripe fruit is unique in this variety and the local name "*Thella chakarakeli*" is derived from the whitish colour of the fruits. It takes about 14½ monthsto mature from time of planting to harvest stage. It is the best banana—an opinion which was shared by the late Sir Arthur Hill, a former Director of the Royal



CHAKKARAKELI

Botanic Gardens, Kew, Surrey, England. It is a commercial variety in the Godavari district where it is largely grown. The comparative small size of the bunch, the rather erect and spreading nature of the fruits and their poor keeping quality when ripe—all these militate against its large scale exportation. The unripe fruits stand well in cold storage for long distance transport. Unripe individual fruits packed in special crates may solve the transport problem. It makes excellent "figs."

Stem yellowish green with large dark blotches on either side of the base of the petiole, glaucous, 8 feet high, circumference at base 26 inches. Leaves broadly elliptic, polished, leathery ; petiole greenish yellow and glaucous, 10 to 12 inches long, circumference 7 inches ; channel of petiole 2 inches broad, 1¼ inch deep, margin of petiole deep red to ¼ inch broad, revolute in young plants towards base of petiole ; lamina 7 to 7¼ feet long, 35½ inches broad ; lamina base right side 3 inches short, truncate and abruptly shortly acute, left side abruptly narrowly acuminate ; apex of lamina right side nearly truncate ; left side ¾ right angle ; number of leaves 32 with an average monthly emergence of 3. Shot blades 3, bottom 5 feet long, lamina portion 4 feet long and 20 inches broad ; second 22 inches long, lamina portion 9 inches long, 4½ inches broad ; third 25 inches long, lamina portion 3 inches long, one inch broad ; distance between the bottom and the third, 12½ inches long. Inflorescence, peduncle glabrous, 18 inches long, circumference 5¼ inches, position of mature bunch ½ right angle to the stem. It has female, persistent male flowers confined to 6 to 10 hands and then deciduous male flowers fertile axis one to 1¼ feet long, persistent male region ¾ foot, deciduous ; male 1½ feet, rather stiff. Bract outside light purple, margins dark purple, inside cream-coloured with reddish tinge, margins inside dark purple, 18·4 centimetres long, 11·2 centimetres broad ; apex very broadly obtuse. Flower, persistent male 5 to 10 hands and the rest deciduous male, 7·2 centimetres long, 1·2 centimetre broad, 1·4 centimetre deep. Calyx (perigonium) 5 centimetres long, 2·1 centimetres broad, calyx outside cream-coloured with grey spots especially towards basal half, calyx inside cream-coloured with grey tinge towards bottom half with a few faint spots ; margins hyaline ; lobes 5, 3 large alternating with 2 small but occasionally the left one is placed much below inside when they are slightly larger than usual ones, yellowish, keels 2. Petals (scale) 3 centimetres long, 2·7 centimetres broad, boat shaped, 2 sides erect, ridge one sometimes two, very prominent ; apex acuminate, erect, ridge sometimes one, yellowish. Stamens 5, 5·4 centimetres long, erect ; filament 2·9 centimetres long, whitish, flat ; anther 2·3 centimetres long, erect, whitish, anther valves brown. Pistillode 7·1 centimetres long, style 5 centimetres long, whitish, stigma yellow, lobes 3-4, distinct, unequal. Ovary, first few hands persistent and the rest deciduous, 2·3 centimetres long, greenish white, partially sided and terete, tapers to base. There is no difference between the persistent male and deciduous male flowers except that the ovary is slightly larger in the former. Pedicel $\frac{1}{4}$ to $\frac{1}{2}$ inch long, 5–unequal sided, 5-ridged; 3 ridges prominent; hands rather loose, 4 to 5, fingers rather loose, 12 in a hand, nearly terete, 5–ridged, one ridge prominent, $4\frac{1}{2}$ to 5 inches long, 5 inches in circumference : about 50 to 60 in a bunch ; fruit tapers to apex, apex $\frac{1}{2}$ inch long, 3-sided, terete, 5-ridged, 3 ridges prominent ; style accrescent to $\frac{3}{4}$ inch long in some fruits ; ripe fruits very strongly attached to the pedicel ; rind whitish green when unripe changing to golden yellow when ripe, apex greenish ; pulp deep cream-coloured, juicy, very sweet with rich and excellent flavour. It has very poor keeping quality.

LATIN.—*Musa sapidisiaca*, K. C. Jacob, var. *chakkarakeliana* Jacob. Margines ad basim petioli revolute, fulgenti rubro colore, $\frac{1}{3}$ inch lati ; albo-viridis quidam color in hac varietate est singularis ; fructus difficillime praeservantur. Caro suavissima cum excellent sapore.

RAJA VAZHAI

Raja vazhai—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *chakkarakeliana* ecotype *rajavazhiana* Jacob.

Local name—Madras (Tamil) *Raja vazhai.*

It is a medium-sized plant found in stray cultivation in the southern districts of the Madras province. It is an ecotype of *Chakkarakeli* but differs from it in the bunches of fruits nearly hanging from the crown of the plant and not like *Chakkarakeli.* When this was grown at Coimbatore under almost the same conditions the peculiar position of the bunch was changed to normal. In other respects there is no difference.

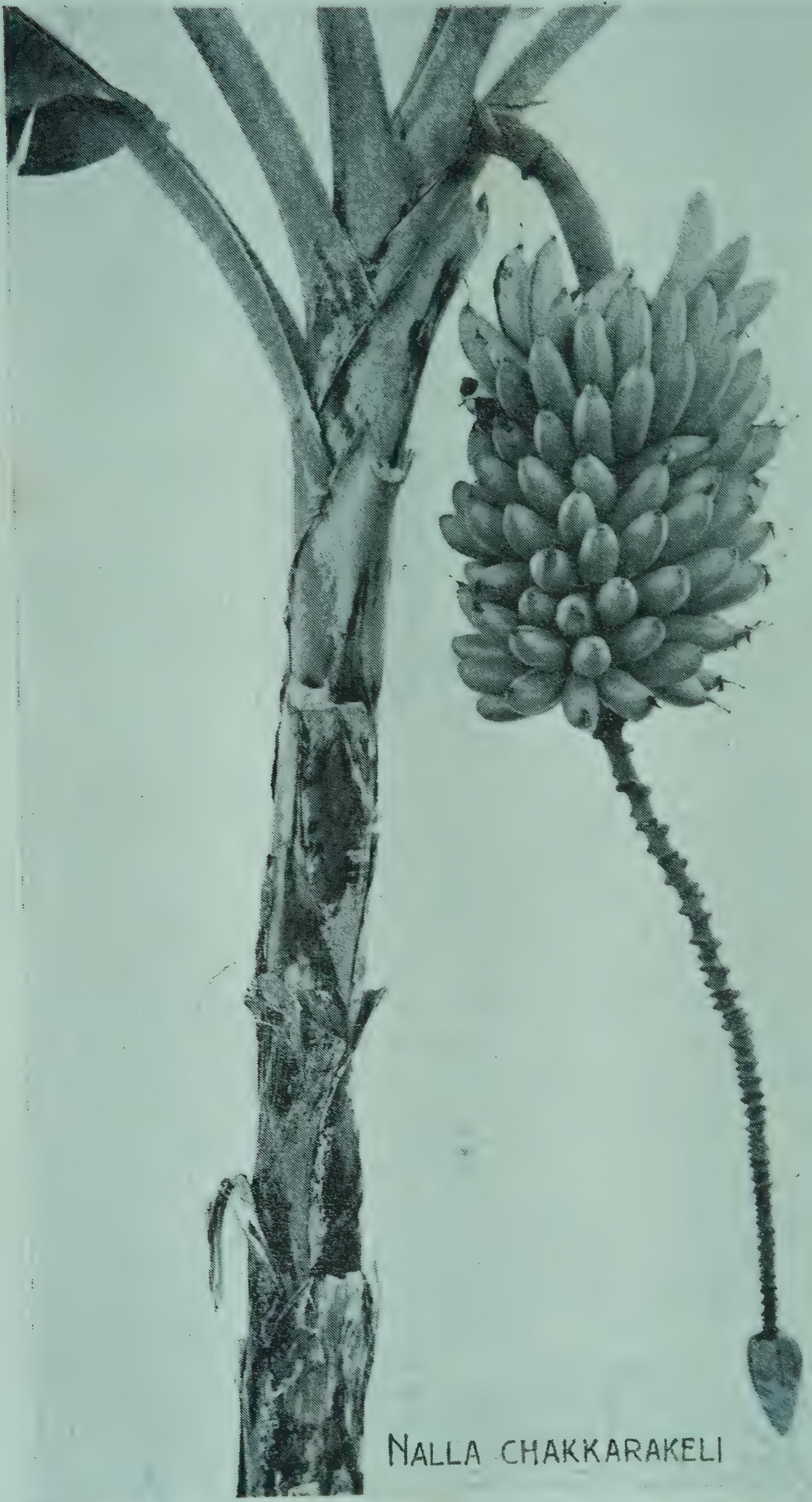
LATIN.—*Musa sapidisiaca*, K. C. Jacob var. *chakkarakeliana* ecotype *rajavazhiana* Jacob : Cognata, sed pendulo racemo ab ea differt.

RAJA BALE

Raja bale—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *chakkarakeliana* Jacob ecotype *rajabaleana* Jacob.

Local name—Madras (Kanarese) *Rajabale.*

It is a medium-sized plant found in stray cultivation in Mysore, Coorg and such other elevated places. It is an ecotype of *Chakkarakeli* but differs from it in the colour of fruits remaining green



NALLA CHAKKARAKELI

on ripening. When this was grown at Coimbatore it produced normal fruits ripening yellow.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *chakarakeliana* ecotype *rajabaleana* Jacob: Cognata, sed viridi colore pellis fructuum maturorum ab ea differt.

NALLA CHAKKARAKELI

Nalla chakkarakeli—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *nallachakkarakeliana* Jacob.

Local names—Madras (Telugu) *Nalla kokri, Nalla chakkarakeli*; (Kanarese) *Kari bale* (Kampli in Bellary district).

It is a medium-sized plant found in stray cultivation in the northern districts of the Madras province. The stalks of bunch and fruit are very short in this variety. It takes about seventeen months to mature to the harvest stage from the time of planting. It is a rare variety not cultivated as pure stand anywhere. It resembles in appearance to the *Karivazhai* of southern districts. It has very short peduncle.

Stem light green with large dark brown blotches and splashes, 9 feet high, circumference at base 24 inches. Leaves narrowly elliptic; petiole 12 to 14 inches long, circumference 4½ inches, greenish yellow, glaucous; channel of petiole one inch deep, 2 inches broad, margin of petiole deep red to 1/6 inch broad; lamina 6¼ to 7¾ feet long, 27½ inches broad; lamina base right side ½ inch short, slightly cordate, left side obtuse or abruptly acute; apex of lamina right side truncate, left side 80°; number of leaves 33 with an average monthly emergence of 3; shot blades 2, bottom erect, 20 inches long seen outside, lamina portion 16½ inches long, 10½ inches broad; top 14½ inches long seen outside, lamina portion 2½ inches long, 1¼ inch broad, basal portion inside pseudo-stem green and the rest dried. Inflorescence, peduncle very pubescent, 7 inches long; position of mature bunch 22½° and nearly pendulous with a bent central axis. It has female and deciduous male flowers only; fertile axis one to 1¼ feet long; sterile axis 1½ to 1¾ feet long, rather stiff, bases of wrists prominent. Bract outside deep pink, glaucous, inside pale white and pitted longitudinally in lines, edges dark-coloured; 25 centimetres long, 13·2 centimetres broad; apex broadly obtuse. Flower, deciduous male 7·1 centimetres long, 9 centimetres broad, 1·1 centimetre deep. Calyx (perigonium) 4·8 centimetres long, 1·9 centimetres broad; calyx outside and inside pale white; lobes 5, all equal, yellowish; keels 2, distinct. Petals (scale) 2·5 centimetres long, 2·5 centimetres broad, boat-shaped, semi-transparent ; apex acute, erect, ridge one. Stamens 5, 5·5 centimetres long, straight ; filament 3 centimetres long, white, flat ; anther 2·5 centimetres long, bent back, longer than the stigma, white with very slight pinkish tinge ; anther valves slightly dark. Pistillode 6·9 centimetres long ; style and stigma 4·9 centimetres long ; style white, turning yellow towards top, stigma yellow, lobes not distinct. Ovary 2 centimetres long, bottom half white and top half greenish ; top half 4 to 5-sided and the bottom half terete. Wrist prominent ; pedicel very short, 1/3 inch long, terete with 2 ridges, hands compact, 7 to 8 ; fingers compact, up to 14 in a hand, terete with one ridge prominent ; 5 inches long, $5\frac{1}{2}$ inches in circumference, fruit tapers to apex ; about 100 in a bunch ; ripe fruits do not drop off easily from the pedicel ; rind medium thick, ripening to yellow ; pulp very soft, juicy, very sweet with a pleasant flavour.

LATIN.—*Musa sapidisiaca*, K. C. Jacob nom. nov. var. *nallachakkarakeliana* Jacob. Longae durationis varietas post 17 menses ad maturitatem perveniens ; pedunculus brevissimus, 7 inch. tantum longus ; " wrist " valde prominens ; pedicellus brevissimus tantum $\frac{1}{3}$ in. longus ; fructus obtusus.

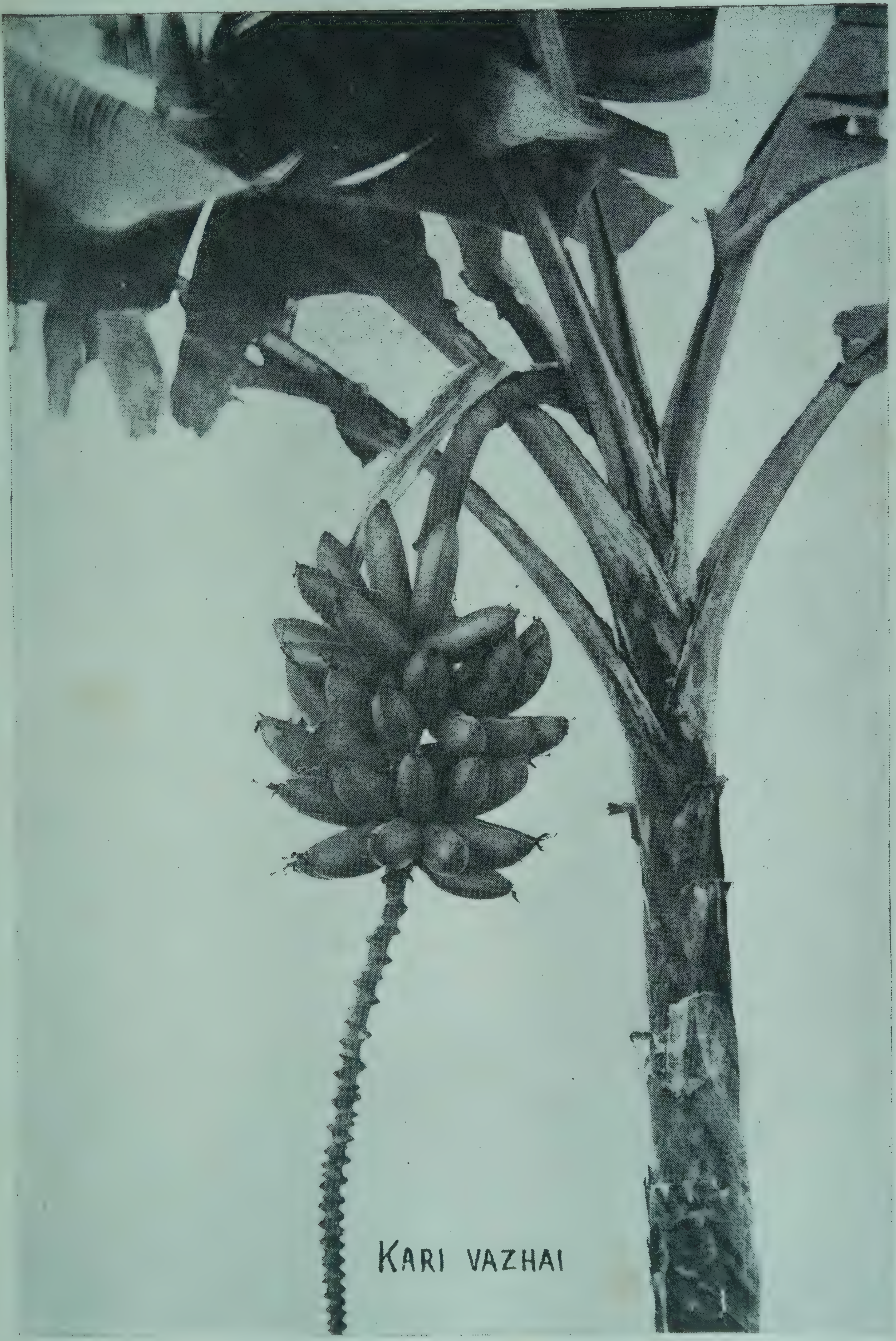
KARI VAZHAI

Kari Vazhai.—Mua sapidisiaca K. C. Jacob nom. nov. var. *karivazhaiana* Jacob.

Local names—Madras (Tamil) *Karivazhai*, *Pachai.*

It is a medium-sized plant found in stray cultivation in the southern districts except on the Malabar Coast. The left margin of the leaf stalk is winged to a width of $\frac{1}{2}$ inch. The stalks of the bunch in this variety is long while that of the fruit is almost absent. The colour of the ' heart ' is pale purple. It takes about $16\frac{1}{2}$ months to mature from time of planting to harvest stage. It is not a commercial variety, nor is it grown as pure stand anywhere.

Stem dull yellow with large dark blotches especially towards the base of the petiole, 9 feet high, circumference at base 26 inches. Leaves linear oblong, polished ; petiole 16 inches long, deep green, circumference $5\frac{1}{2}$ inches ; margin of petiole a thin red line ; channel of petiole $1\frac{1}{2}$ inches broad, one inch deep ; lamina $6\frac{3}{4}$ feet long, $15\frac{1}{2}$ inches broad ; lamina base right side 2 inches short, broadly obtuse, left side acuminate ; apex of lamina right side truncate, left side 80° ; number of leaves 35 with an average monthly emergence of 3. Inflorescence, peduncle 15 inches long, pubescent, position of mature bunch 50° to the stem ; it has female and deciduous


KARI VAZHAI

male flowers only ; fertile axis ¾ to one foot long, deciduous male portion 1½ to 1¾ feet long, rather stiff. Bract outside dark purple, glaucous ; inside greenish yellow and light violet towards apex, 19·3 centimetres long, 12·3 centitmetres broad ; apex broadly abtuse with a slit at the extreme tip. Flowers deciduous male, 6 centimetres long, ·6 to ·7 centimetre broad, ·7 to one centimetre deep ; calyx (perigonium) 4·3 centimetres long, 2·0 centimetres broad, margin hyaline ; calyx outside dull white ; inside creamy white ; lobes 5, 2 small alternating with 3 fairly large ; yellowish ; keels 2, not prominent. Petals (scale) 2·2 centimetres long, 2 centimetres broad ; margins not touching, 2 sides compressed ; ridges 2 or 3, crowded, or one over the other, apex awl-shaped, minute ; margin of petal bent inside towards apex. Stamens 5, 4·5 centimetres long, erect ; filament 2·1 centimetres long, white, slightly flat, erect ; anther 2·1 centimetres long, slightly bent outwards, white ; anther valves dark grey. Pistillode 6·2 centimetres long, style 4·5 centimetres long, whitish ; stigma yellowish brown, lobes 5, not prominent ; ovary deciduous, 1·6 centimetre long, greyish white, tapers to base, two-sided and terete. Wrist up to ½ inch broad ; pedicel almost absent ; hands 4 to 5, fruits up to 12 in a hand, 3½ inches long, circumference 4¼ inches, nearly-terete, 5-ridged, 3 ridges prominent ; fruit tapers to apex ; apex ¼ inch long, 5-ridged, 2 ridges prominent ; about 45 in a bunch ; fruits drop off easily ; rind when ripe yellowish, medium thin ; pulp soft, juicy and fairly sweet.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *karivazhaiana* Jacob. Longae durationis varietas post 16½ menses ad maturitatem perveniens ; latus dexterum laminae ad basim sinistro 2 inch. brevius ; margo petioli latere sinistro alatus ; ala usque ad ½ inch. lata ; pedunculus 15 inch. longus, pubescens ; pedicellus fere nullus ; fructus maturi facile delabuntur.

MANORANJITHAM

Manoranjitham—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *karivazhaiana* Jacob ecotype *manoranjithamiana* Jacob.

Local name—Madras (Tamil) *Manoranjitham.*

It is a medium-sized plant found in stray cultivation at Kulitalai, Tiruchirappalli district. If differs from Karivazhai in that the ripe fruits of this variety possess a strong pleasant odour. This characteristic odour noticed in the '*Manoranjitham*' variety of Kulitalai in Tiruchirappalli district declined gradually when it was introduced into Coimbatore and after three or four generations the odour completely disappeared with the result that the plant became identical with the *Karivazhai* of Coimbatore. It is, therefore, an eco-type of *Karivazhai.*

LATIN.—Longae durationis varietas post 16½ menses ad maturitatem perveniens. Latus dexterum laminae ad basim sinistro 2 inch. brevius; margo petioli latere sinistro alatus; ala usque ad ½ inch. lata; pedunculus 15 inch. longus, pubesceus; pedicellus fere nullus; fructus maturi facile delabuntur.

CHENKADALI

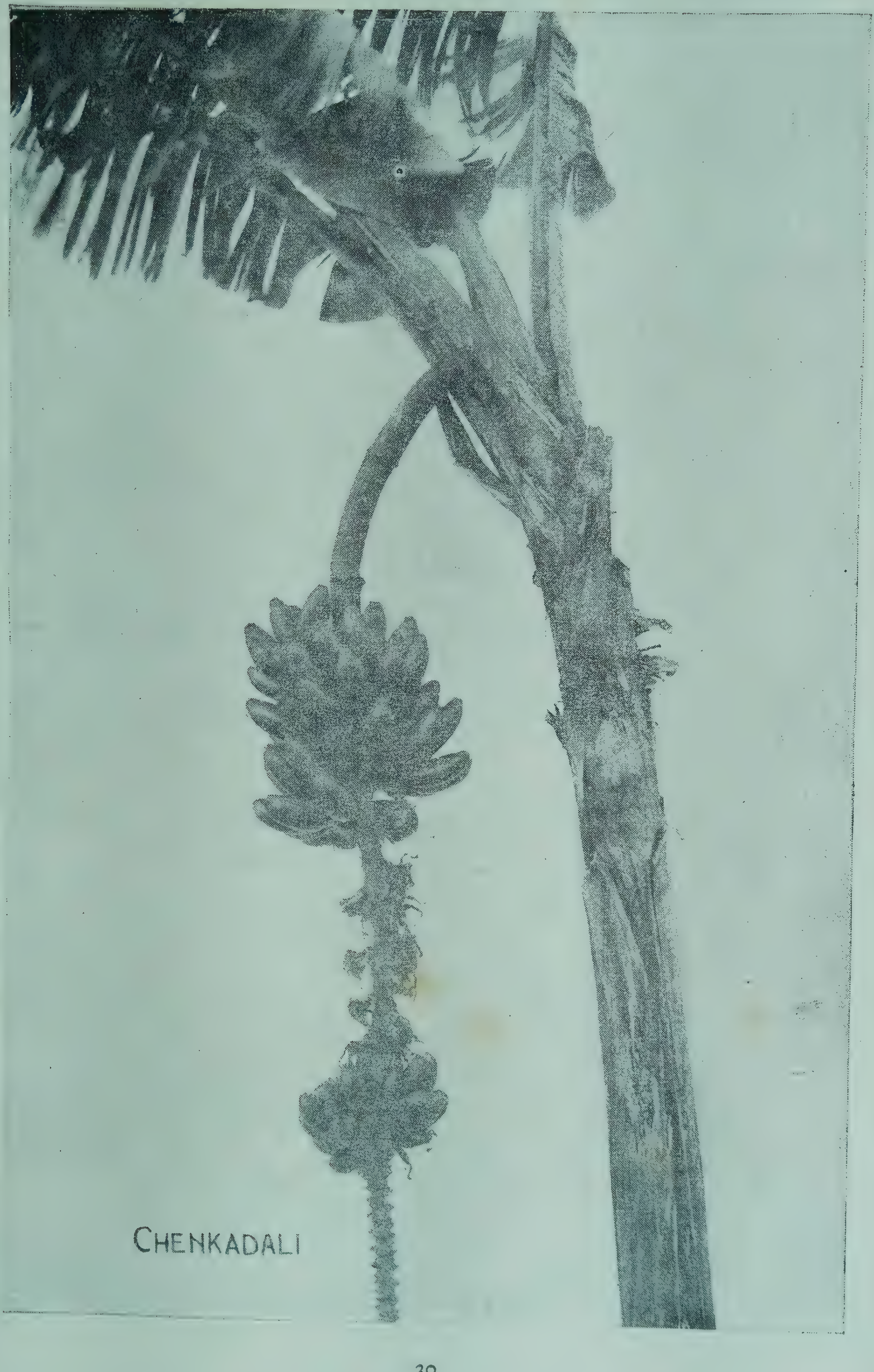
Chenkadali.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *rubra* (Firminger) Jacob.

English names—Red banana, Red Jamaica banana, Red Spanish banana, Baracoa banana.

Local names—Madras (Tamil) *Chev vazhai*; (Telugu) *Yerra aratti*; (Hindustani) *Lal mowze*; (Kanarese) *Chendra bale, Chontha bale, Kenpu bale, Kunkuma bale, Sakalathi vale*; (Malayalam) *Chenkadali, Chorakadali, Chora poovan, Chuvanna kappa, Chuvanna chevvazha, Kappa, Karim kadali* (Kalpatta, Wynaad), *Malan poovan, Raktha kadali*; Orissa—*Beet java*; Bombay—*Velchi, Lal kela*; Ceylon—*Chev. Ratambala*; Siam—*Klui naak*; Malaya—*Pisang rajah udang*; Burma—*Shwe-hunget-pyaw*; Venezuela—*Cambur morado.*

It is a tall and stout plant found in all the banana growing countries of the world. This is a long duration variety and the flowers open at night time unlike most other banana flowers, which open in the evening. It requires heavy doses of manure for successful growth. It takes about 18 months to mature from time of planting to harvest stage. It is not generally grown as pure stand, a few plants, however, are found in stray cultivation especially in hilly tracts along with other varieties of banana. It exhausts the soil rather quickly and requires heavy doses of manure to recoup. The fruits are in great demand in the cities of Mysore and Bangalore. The author has seen the green sport, *Venkadali* in a stool of *Chenkadali.*

Stem tall, stout, greenish purple, 14 to 16 feet high, circumference at base 3 feet. Leaves large, oblong, slightly brittle, polished, veins prominent, midrib prominent, purple; petiole greenish purple, 26 inches long, circumference 4¾ inches; channel of petiole 1½ inches broad, one inch deep, margins of petiole deep purple, ½ inch broad, lamina base equal, right side slightly cordate and abruptly acute, left side abruptly acuminate, 9½ feet long, 35 inches broad; apex of lamina right side truncate, left side ¾ right angle. Number of leaves 37 with an average monthly emergence of 3. Shot blades 2, bottom 29 inches long, the lamina portion 4½ inches long, 1½ inches broad; top 21 inches long, 8 inches broad; distance



CHENKADALI

between the 2 shot blades 6½ inches. Inflorescence, peduncle pubescent, 12 to 14 inches long, position of mature bunch 50° to the stem. It has female, persistent and deciduous male flowers ; fertile axis 1¼ to 1½ feet long, length of persistent male portion 6 to 9 inches long and the length of deciduous male 2 to 3 feet long. Bract deciduous, outside dark purple and glaucous, inside dark red with longitudinal corrugations in the bottom half, 18·5 centimetres long, 13·2 centimeters broad ; apex nearly rounded with a mucro. Flower, persistent male 6 to 10 hands and the rest deciduous male, 62 centimetres long, 5 millimeters broad, one centimetre deep. Calyx (perigonium) 4·5 centimetres long, 1·9 centimeters broad, outside purplish towards basal half and dull white towards top half, inside dull white, number of lobes 5, 2 small alternating with 3 large, two inner distinctly yellow and the outer dark brown and rolled back ; keels 2, very distinct in the lower series and indistinct in the upper series. Petals (scale) 3 centimetres long, 2·2 centimetres broad, boat shaped, 2 sides erect, number of ridges 2 ; apex acute, nearly erect, with or without a ridge. Stamens often 5, occasionally 3 normal and 2 undeveloped or 2 normal and 3 undeveloped or 4 normal and one aborted, 4·7 centimetres long, with a slight bent at the junction of the filament and anther ; filament 2·3 centimetres long, dull white, slightly flat, nearly straight ; anther 2·2 centimetres long, very stout, whitish ; anther valves grey, pollen few. Pistillode 5·9 centimeters long, style 4 centimeters long, whitish, stigma yellowish, number of lobes 5, ovary persistent and deciduous, 1·5 centimetres long, greenish towards basal half and dark-red and greenish towards top half, 4 to 5-sided, stout and abruptly tapers to base, base of wrist raised and ribbed. Pedicel ½ to ¾ inch long, 4 to 5-unequal sided, 4 to 5-ridged, 2 ridges prominent. Hands 5 to 7 ; fingers rather compact, 11 to 25 in a hand, slightly thickened towards base, terete with 2 to 3 ridges, 2 being slightly prominent, 6½ inches long, and 7 inches in circumference, 40 to 85 in a bunch ; apex indistinct, about ½ inch long, fruit tapers to apex ; it does not easily drop off from the pedicel ; rind when ripe red, medium thick ; pulp, cream-coloured, sweet with good flavour. It is a delicious banana and is not used for culinary purpose. Weight of bunch 25 lb.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *rubra* (Firminger) Jacob. Varietas durationis longissimae maturitatem post menses 18 attingens ; truncus maximus ; laminae bases aequales ; pedunculus pubescens ; non ut in plurimis aliis varietatibus flores nocte adaperiuntur ; fructus purpures rubro colore ; apex fructus vix ullus.

VENKADALI

Musa sapidisiaca K. C. Jacob, nom. nov. var. *rubra* forma *venkadaliana* Jacob.

English names—Green Red, White Claret.

Local names.—Madras (Tamil) *Chevvazhai* (Gudalur, Nilgiris), *Kari vazhai*, *Ney vazhai*, *Pachcha chevvazhai*, *Vella vazhai*; (Telugu) *Kappurapu Keli*, *Randavarakham chakkarakeli*; (Kanarese) *Blay suganthi*, *Elakki bale*; (Malayalam) *Chora poovan*, *Karim kadali*; (Manantoddy, Wynaad), *Malam poovan*, *Pachcha kadali*, *Pachcha vettan*, *Thekkan poovan*, *Thuluvan*, *Vella chevvazhai*, *Vella kadali*, *Vella kappa*, *Vella poovan*, *Veluththa chenkadali*, *Venkadali*; (Ceylon) *Marthamalu*.

It is a tall and stout plant found in stray cultivation in all the banana growing countries of the world. It is a sport of *Chekadali* and differs from it in the following characters :— the colour of stem, petiole, midrib and unripe fruits light green. The colour of ripe fruit yellowish and number of hands and fingers generally fewer than the red banana. The taste and flavour of the pulp of the ripe fruits are the same as *Chenkadali*.

Description of the plant, leaf, flower and fruit, same as *Chenkadali*, except the colour.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *rubra* forma *venkadaliana* Jacob. Sport of *Chenkadali*; a var. *rubra* differt co quod omnes partes sint virides fructus que maturi flavidi; justus saporque carnis ut in var. *rubra*.

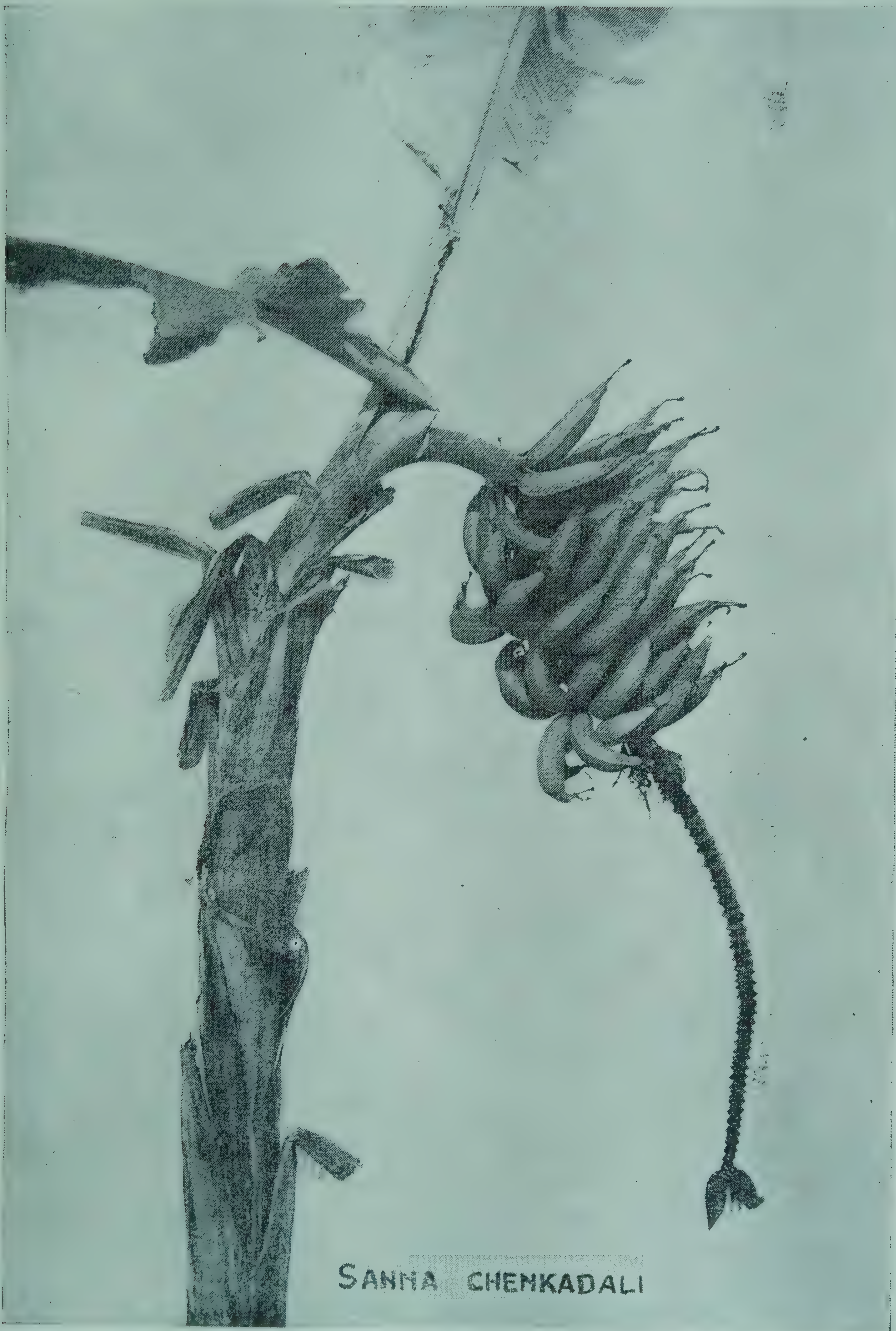
SANNA CHENKADALI

Sanna chenkadali.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *sannachenkadaliana* Jacob.

Local name.—Madras (Hind.) *Lal kel.*

It is a slender plant with small and narrow leaves grown in the Government Fruit Station, Kallar, Coimbatore district. The colour of the leaves especially on the under surface is purplish. This has been introduced from Bombay. It takes about 16 months to mature from time of planting to harvest stage. It is a very delicate variety and does not thrive well at Coimbatore. The bunches are so small and the fruits are so slender that the cultivation of this variety is held to be not a commercial proposition.

Stem light purple with dark blotches below the petiole, 7 feet high, circumference at base 16 inches. Leaves linear oblong, both surfaces glabrous; petiole light purple, 16 inches long, 4 inches in



SANNA CHENKADALI

circumference, channel ½ inch wide, 5/8 inch deep, mid-rib slender, light purple, channel of petiole inside light purple to half the lamina; lamina 5¼ feet long, 21 inches broad, lamina margin purple to 1/8 inch broad; lamina base right side one inch short, cordate; left side abruptly acute; apex of lamina right side truncate, left side 80°. Inflorescence, peduncle very short about 4 inches long, pubescent. It has female, one or two hands of persistent male and the rest deciduous male flowers; position of mature bunch about 45° to the stem; fertile axis about one foot long, sterile axis rather stiff, 1¾ feet long. Bract outside, deep purple, slightly glaucous; inside cream-coloured and dark red inter-mixed, 12·6 centimetres long, 5·3 centimetres broad; apex nearly rounded with a mucro. Flowers deciduous male, 5 centimetres long, ·3 centimetres broad, ·6 centimetres deep. Calyx (perigonium) 3·6 centimetres long, 1·4 centimetres broad, calyx outside and inside dull white; lobes 5, 2 slightly small alternating with 3 slightly large, dark brown and slightly yellowish; margins of the lobes hyaline, keels 2, prominent in the lower row; one or two in the upper row. Petals (scale) 1·7 centimetres long, one centimetre broad; 2 sides erect; ridges 2, not prominent; apex bent inwards, with an awn of 0·2 centimetre long. Stamens 5, 3·3 centimetres long, all equal; filament 3·2 centimetres long, whitish, flat; with a slight bent at the junction of anther and filament; anther 1·5 centimetres long, tapers to a point and apex bent back, whitish; anther valves grey. Pistillode 5 centimetres long, style 3·5 centimetres long, whitish; stigma yellowish; lobes 4, not very stout, distinct, yellowish. Ovary deciduous, 1·5 centimetres long, greenish white, slender, 4 to 5-sided, gradually tapers to base. Wrist prominent, ½ inch broad, pedicel slender, ½ inch long, 5-unequal sided, 5-ridged, 2 ridges prominent; hands rather loose, 6 to 8; fingers rather loose, up to 12 in a hand, terete with 5 ridges, 2 ridges prominent; 4½ inches long, 3 inches in circumference. Apex distinct, ¾ inch long, 5-unequal sided, 5-ridged, all ridges prominent, style persisting; about 60 in a bunch; ripe fruits do not drop off easily from the pedicel; rind thin, ripening to reddish; pulp reddish, juicy, soft, sweet with a good flavour.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *sannachenkadaliana* Jacob. Planta tenera angustis foliis. Omnes partes inferioribus superficiebus foliorum inclusis purpureo colore; pedunculus brevissimus, 4 inch. longus, pubescens; "wrist" prominens, ½ inch latus. Fructus teneri, longi, purpureo colore; apex ¾ inch longus, maturitate ruber.

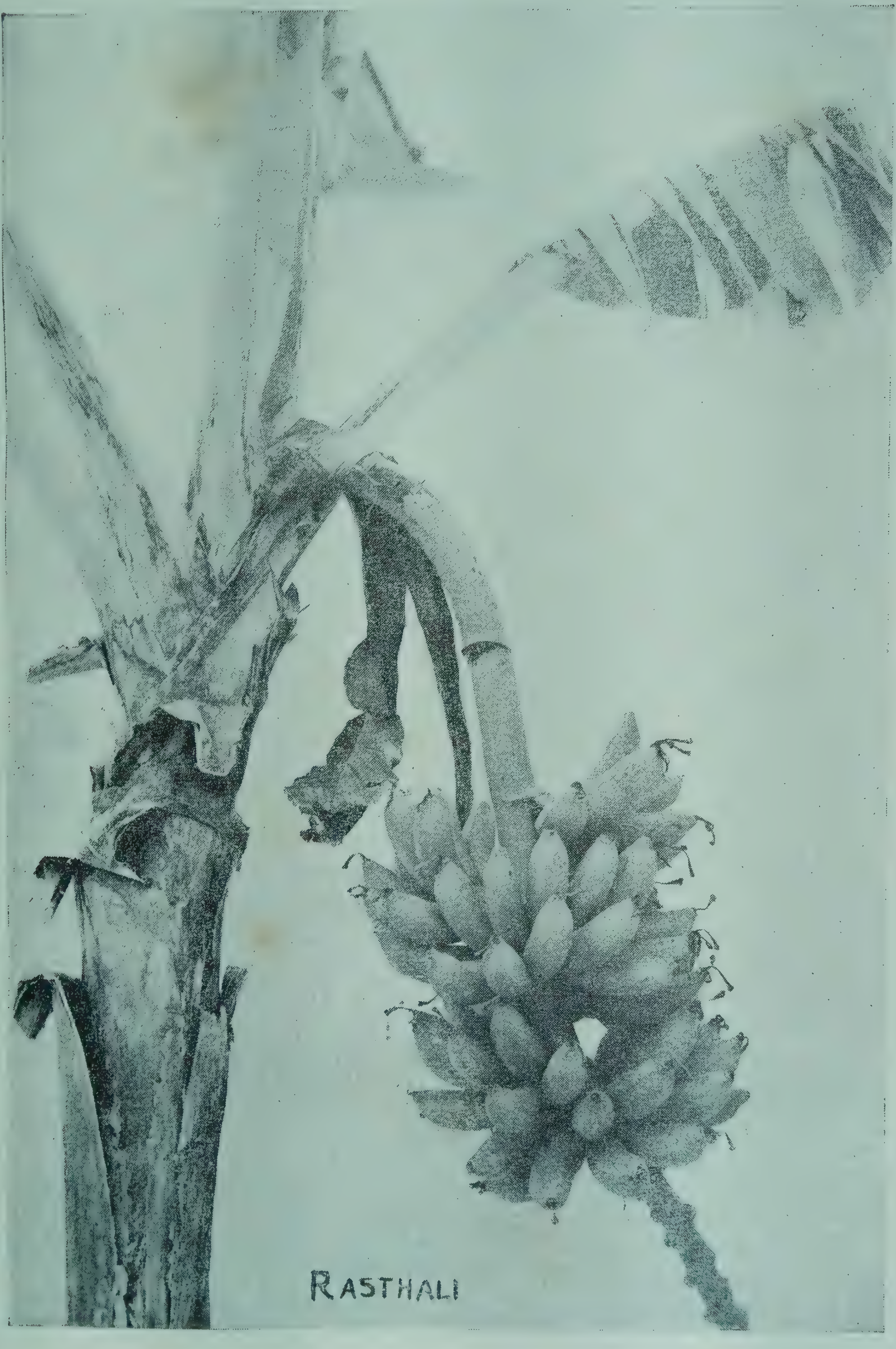
RASTHALI

Rasthali.—Musa sapidisiaca, K. C. Jacob, nom. nov. var. *champa* (*Hort.*) *Jacob.*

Local names.—Madras (Tamil) *Karkandu vazhai, Nattu poovan, Poovan* ; (Tenkasi, Tirunelveli district), *Rasthali, Ullur poovan,* (Telugu) *Amrithapani, Bengala, Desi, Karpura chakkarakeli,* (Challapalli, Kistna district), *Mokkiri, Pallu, Pedda sugandan, Poo suganthi, Sugantha, Thella mokiri* ; (Kanarese) *Bele suganthi, Hoobale, Nanjangud rasa bale, Rasa bale, Siruguppa bale* ; (Malayalam) *Anna poovan, Ari poovan, Nattu poovan, Nattu thuluvan Poovan, Thuluvan* ; Central Provinces—*Buttam, Sonkela, Ellaichi* ; Orissa—*Jalakonda mokiri, Kothia, Patkapura* ; Assam—*Malbhogkola* ; Ceykon—*Parangi Kolikuttu* ; Burma—*Htaw-bat* ; Foreign —*Silk.*

It is fairly a large plant extensively cultivated in the Madras province and found in all the banana growing countries of the world. The right base of the leaf blade is shorter than the left by 3½ inches. The margins of the leaf stalk and part of the leaf sheath near the leaf stalk are red to a width of 1/6 inch. It takes about 15½ months to mature from time of planting to harvest stage. The fruit is considered one of the most delicious of bananas throughout the world. When the plants are heavily manured and given good treatment the bunches grow large and the fruits big in size, but at the expense of taste and flavour ; sometimes lumps develop in the pulp of the ripe fruits. When it is grown under natural conditions the ripe fruit attains a delicacy of flavour not attainable under artificial treatment. Such fruits develop tiny red spots on the rind when flecked, while fruits grown under special treatment display a dull yellow colour. The plant has very strong root system ; hence it can be grown in places affected by stormy winds. Generally it needs no prop when in bunch ; unripe fruits are used for making banana "nuts." The unripe banana fruit, after removal of the rind, is cut lengthwise across the middle and each half is cut into 3 or 4 pieces of one inch in length. These are fried in coconut oil and made into "chips" which are then mixed with cane jaggery syrup. The process is so nicely conducted as to leave on each chip a thin layer of jaggery, which gets dry on exposure. This candied chips are kept in air-tight containers and they keep well for 2 to 3 months.

Stem light green with dark brown splashes, 9 feet high, circumference at base 26½ inches. Leaves glaucous below, petiole yellowish green, very glaucous, 1¼ foot long, circumference 4½ inches ; channel of petiole ¼ inch wide, ¾ inch deep, margin red to 1/6 inch broad,


RASTHALI

Lamina elliptic, 6 feet 2 inches long, 26 inches broad, lamina base right side 3 inches shorter than the left side, broadly obtuse, left side acute, apex of lamina right side truncate, left side 67° ; number of leaves 36 with an average monthly emergence of 3. Shot blades 2, bottom large or small, erect or dropping, absent in some, 28 inches long (seen outside) ; lamina portion 19 inches long, 14½ inches broad ; top 25 inches long, lamina portion 2 inches long, 1½ inch broad (dried). Inflorescence, penduncle glabrous, 19 inches long, circumference 6¼ inches ; position of mature bunch pendulous and nearly parallel to the stem. It has female, 4 to 10 hands of persistent male and the rest deciduous male flowers ; fertile axisto one 1½ feet long, sterile axis 2½ to 3 feet long. Bract outside dark purple, glaucous ; inside dark red, smooth ; margins dark purple to 1/3 inch ; apex nearly rounded ; 17·8 centimetres long, 11·6 centimetres broad. Florets 15 in a hand ; persistent male in the bottom 4 to 10 hands and then deciduous male ; floret 6·7 centimetres long, ·4 centimetres broad, ·9 centimetres deep. Perigonium : keels are fairly prominent in the lower series while those of the upper series are not prominent ; pale white with often brown spots or sometimes brown blotches ; margins hyaline 4·7 centimetres long, 1·7 centimetres broad ; apex 3-lobed with 2 very small lobes at the sinuses ; lobes yellowish. Scale cream-coloured, hyaline ; apex erect, 2 millimetres long, yellowish ; ridges two or three, prominent, 2·6 centimetres long, 2·1 centimetres broad. Stamens 5, 4·4 centimetres long ; filament 2·3 centimetres long, white ; anther 2·1 centimetres long, white with brown anther valves. Pistillode 6·8 centimetres long ; style 4·8 centimetres long, nearly erect, fairly stout ; stigma 3 millimetres long, rather stout, unequally and indistinctly 3 to 4-lobed, light brown. Ovary persistent in 4 to 10 bottom hands and the rest deciduous ; 2 centimetres long, ivory white, unequally and indistinctly 5-sided, the posterior side the broadest. Pedicel ¼ inch long, 4-unequal sided, 4-ridged, 2 prominent ; hands not compact, 5 to 7 ; fingers not compact 11 to 13 in a hand ; terete with 5 ridges, 2 prominent ; 5 inches long, 4 and 5/8 inches in circumference, fruit tapers to apex, apex ¼ inch long, nearly terete, 2 ridges prominent, dried styles often persistent ; about 50 to 80 in a bunch ; ripe fruits drop off rather easily from the pedicel ; rind rather thin, ripening to yellow often with reddish spots ; pulp cream-coloured, mealy, very sweet with an excellent flavour.

LATIN.—*Musa sapidisiaca*, K. C. Jacob, nom. nov. var. *champa* (Hart.) Jacob. In hac planta radicum systema valde firmum. Latus dexterum ad basim laminae sinistro 3½ inch. brevius ; petioli margines rubro colore ; adsunt circiter 10 "hands" florum masculorum persistcutium ; fructus fere teretes ; caro dulcissima sapore excellenti.

AYIRANKA RASTHALI

Airanka rasthali.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *champa* (Hort.) forma *ayirankarasthaliana* Jacob.

Local names—Madras (Tamil) *Ayiram kuchchi*, *Ayiranka poovan*, *Poovilla konai*, *Poovodiya vazhia* ; (Telugu) *Veyyikai aratti* ; (Malayalam) *Ayiram poovan*, *Ayiranka poovan* ; Foreign—Guindy.

It is a large plant with broad leaves. It is not possible to make out this variety from *Rasthali* before flowering. It is found in stray cultivation throughout the Madras province and is not grown as pure stand. It is a sport of *Rasthali* but differs from it in the following characters :—Normally there are only pistillate flowers in this and all of them develop into fruits. A small or large gap is often formed in the middle of the bunch when the plants do not have the optimum conditions of growth. This gap may be large or small according to the fertility of the soil. It is formed by the development of deciduous male flowers in this region which drop off leaving that portion of the axis naked. A normal bunch may weigh from 50 to 75 lb. with about 500 fruits of varying sizes from 7 inches long at the base to 2 to 3 inches towards the extremity. It takes about 15½ months to mature from time of planting to harvest stage. The flavour of ripe fruits is similar to *Rasthali* but the taste is slightly sour. The author has noticed the reversion in two cases of this form to the parent *Rasthali* type of bunches.

Description of plant, leaf and fruit same as *Rasthali*.

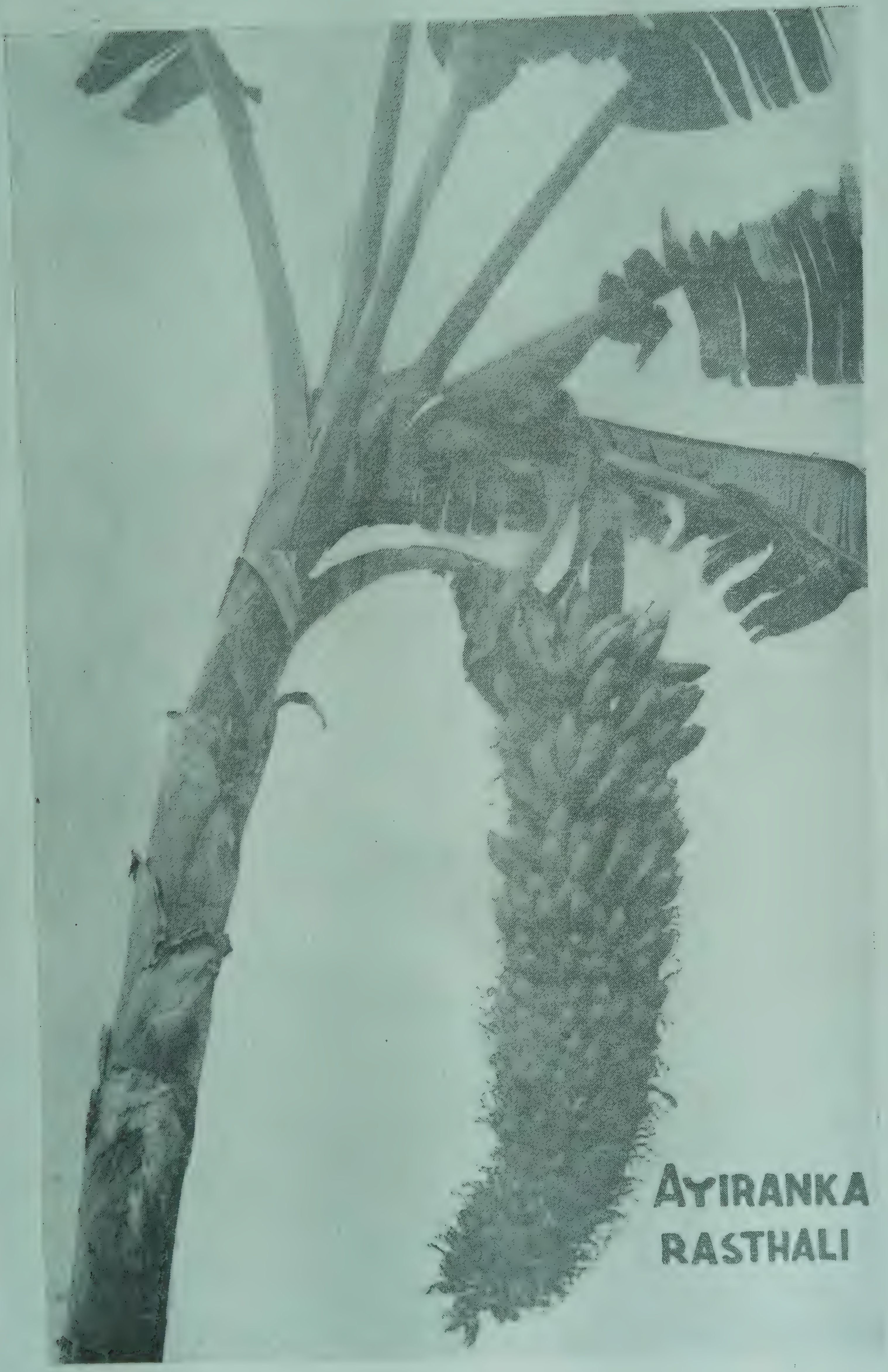
LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. champa (Hort.) forma *ayiramkarasthaliana* Jacob. Sport of *Rasthali* cum floribus pistillatis tantum. Optimis coudicionibus incrementi absentibus parva vel magna lacuma formatur productione florum deciduorum staminatorum circa medium racemi ; ceteroquin nulla differentia cum *Rasthali*.

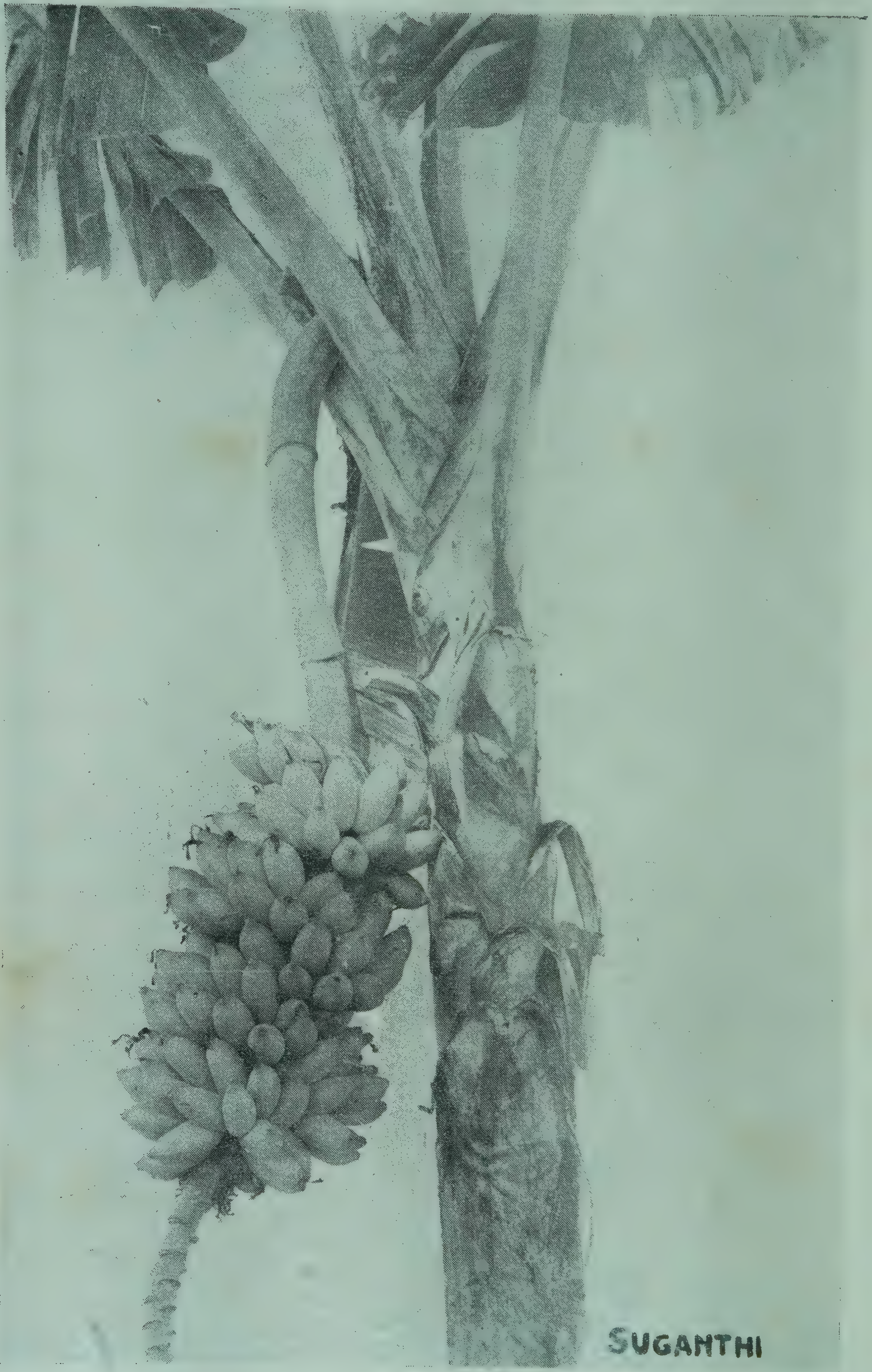
SUGANTHI

Suganthi.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *suganthiana* Jacob.

Local names.—Madras (Kanarese) *Puttu bale*, *Suganthi*.

It is a tall and stout plant found only in two places, viz., at Benhope Estate, Nilgiris and Sirugappa in the Bellary district. It is


AYIRANKA
RASTHALI


SUGANTHI

extensively cultivated at Siruguppa and the neighbourhood in the Bellary district. It takes about 15 months to mature from the time of planting to harvest stage. It is a favourite fruit in parts of the Bellary district. The bunch and the fruits have the appearance of *Rasthali*. The ripe fruit keeps well and the pulp is of medium quality. It will be an ideal variety to be grown extensively under the Tungabhadra Project.

Stem yellowish green with reddish tinge and dark splashes: 8¼ feet high, circumference at base 25 inches. Leaves glaucous below, petiole 20 inches long, circumference 4¾ inches, stout, greenish yellow; channel of petiole ¾ inch deep, 1/8 inch wide; margin deep red to 1/6 inch broad; lamina broadly oblong, 7¼ feet long, 29 inches broad, lamina base right side longer by ½ to ¾ inch, auricled, auricle 2 inches deep; left side deeply auricled, auricle 3 inches deep; apex of lamina right side truncate, left side 87½° ; shot blades 2, bottom erect or drooping, 3¾ feet long seen outside, lamina portion 3¾ feet long, 20 inches broad; top (dried) 27 inches long, lamina portion 4 inches long, 1¾ inches broad. Inflorescence, peduncle pubescent, 24 inches long, circumference 7 inches; position of mature bunch, pendulous with a bent central axis; it has female and deciduous male flowers only; fertile axis 1¼ to 1½ feet long; sterile axis 2 feet long. Bract outside dark purple, glaucous, distinctly furrowed lengthwise; inside red; margins dark red; 18·5 centimetres long, 9·5 centimetres broad; apex rounded. Flowers deciduous male, 6·4 centimetres long, 0·6 centimetre broad, 0·6 centimetre deep. Calyx (perigonium) 4·6 centimetres long, 1·7 centimetres broad; calyx outside pinkish white, margins hyaline; inside same as outside; lobes 5, prominent, 2 small alternating with 3 large, yellow; keels 2, very prominent in the lower series and less prominent in the upper series. Petals (scale) 1·9 centimetres long, 1·8 centimetres broad, the 2 sides touching; ridges 2; apex acute, very short. Stamens 5, 3·8 centimetres long, with a slight bend at the junction of the filament and the anther; filament 1·6 centimetres long, white, flat; anther 2·2 centimetres long, slightly bent towards apex, creamy white; anther valves grey. Pistillode 6·2 centimetres long; style and stigma 4·4 centimetres long; style white, red spotted towards stigma; stigma yellowish; lobes 5, prominent, much longer than anther. Ovary deciduous, 1·8 centimetres long, white with greenish tinge, irregularly 4 to 5-sided, tapering towards base. Pedicel 5/8 inch long, stout, 4-unequal sided, 4-ridged; hands compact, 6 to 8; fingers compact, up to 14 in a hand, terete with 5 ridges, 2 prominent; 5 inches long, 6¼ inches in circumference. Fruit tapers to apex, apex ½ inch long, nearly terete with one flat side; style persistent; about 75 in a bunch; ripe fruits do not drop off easily from the pedicel ; rind medium thick ripening to yellow ; pulp rather tough, juicy, deep cream-coloured, sweet.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *suganthiana* Jacob. Apparentia *Rasthali* similis ; margines petioli rubido colore ; latus dexterum ad basim laminae sinistro longius ; in hac varietate tantum ambae bases profunde auriculatae. Fructuum racemi trunco innitentes ; pedunculus duobus pedibus longus, pubescens ; fructus teres, uno latere planus ; caro potius lenta dulcis.

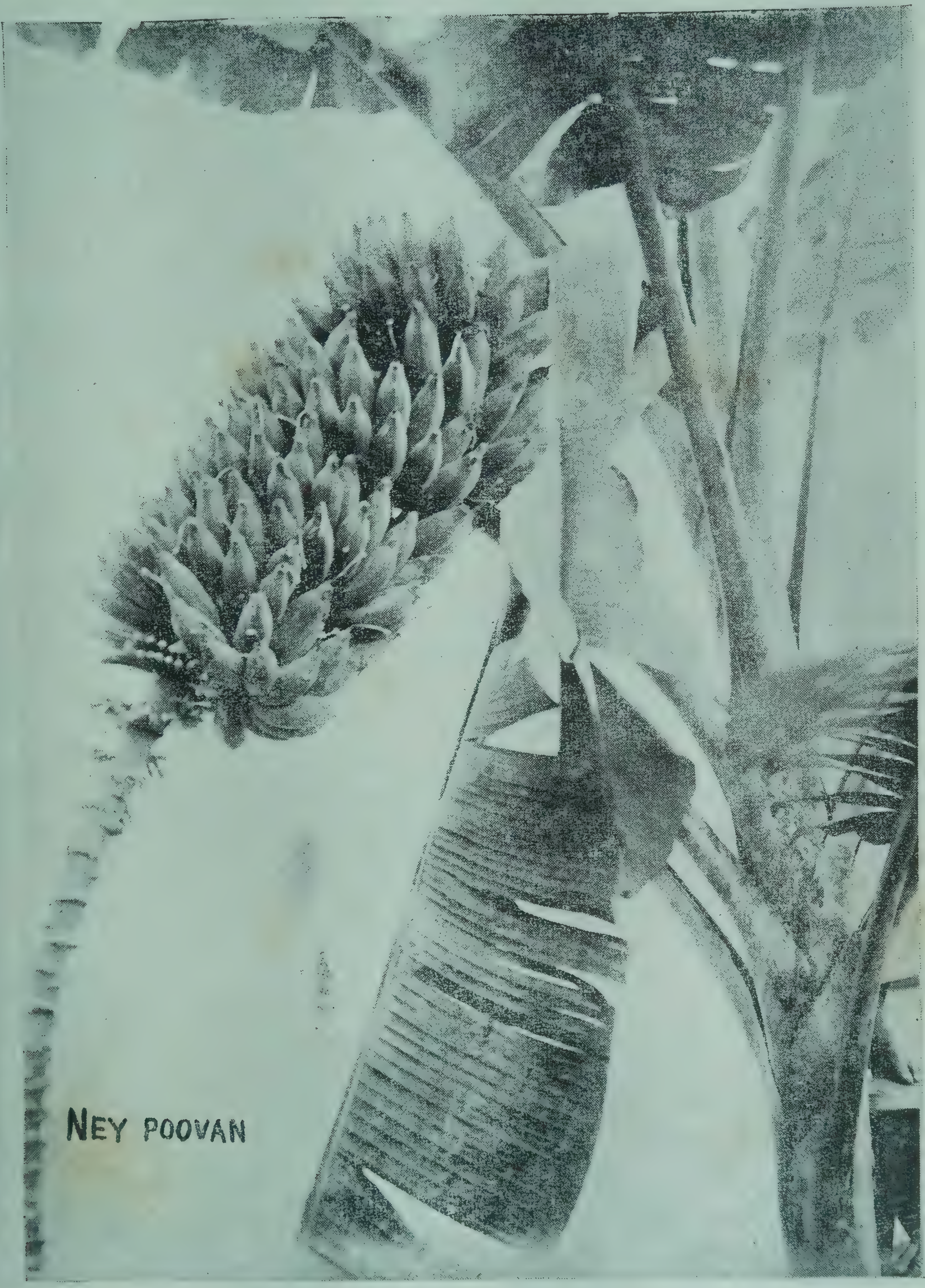
NEY POOVAN

Ney poovan.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *neypoovaniana* Jacob.

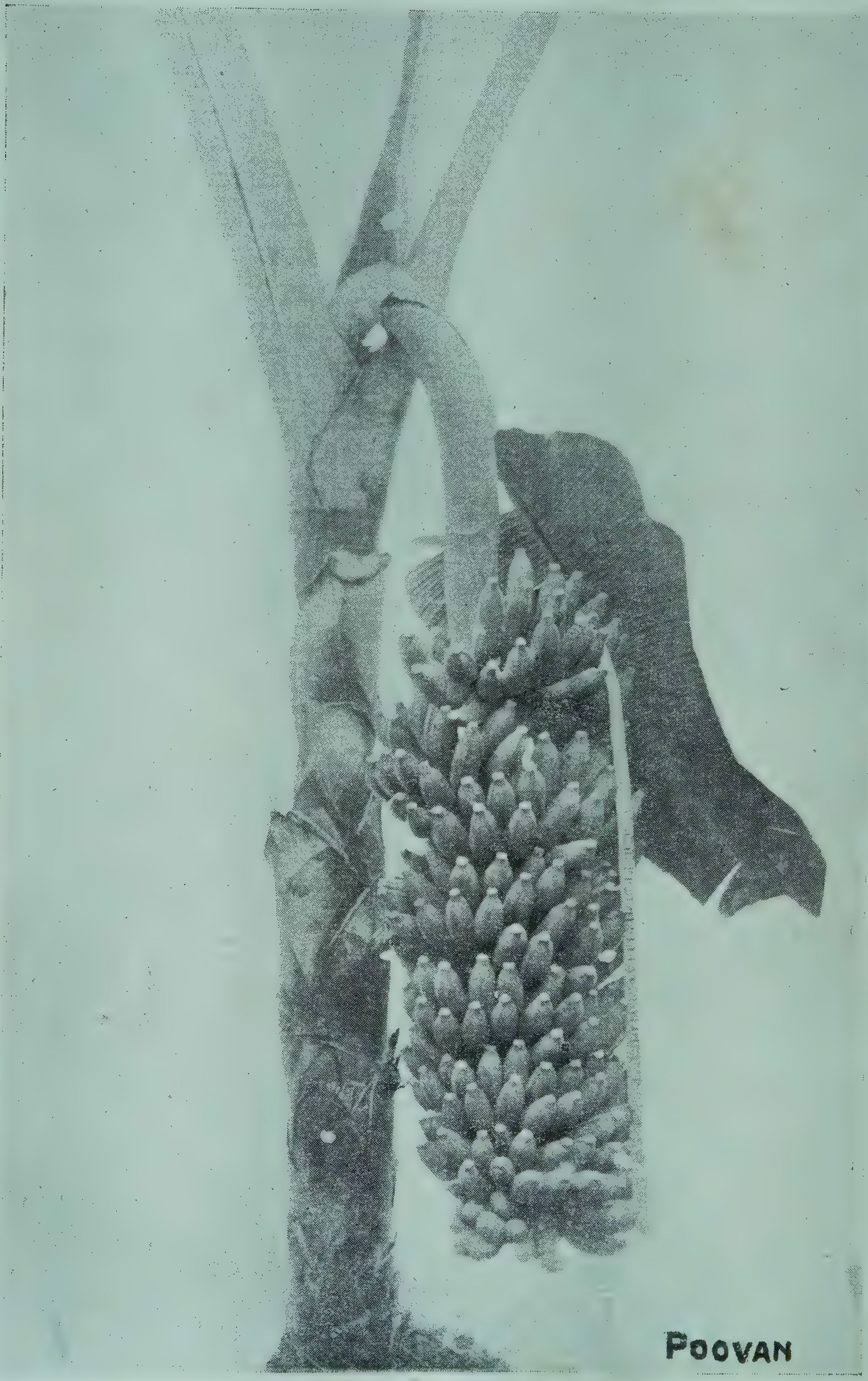
Local names—Madras (Tamil) *Mysore rasthali* ; (Telugu) *Karpurapu aratti*, *Rasadala* ; (Kanarese) *Deva bale*, *Hoo bale*, *Elakki bale*, *Poo bale*, *Puttu bale*, *Puttu sugantha*, *Raja bale*, Sugantham ; (Malayalam) *Adakka poovan*, *Ari poovan*, *Kadali* (Kongad, Malabar), *Kadali poovan*, *Kannan poon-kadali*, *Kunnan poovan*, *Madhura annaan*, *Ney kadali*, *Ney poovan*, *Nhali poovan*, *Nhani poovan*, *Thekkan kadali*, *Tirunelli poovan*, *Thulunaattu kadali*, *Vadakkan dakali* ; Bombay—*Sufed velchi.*

It is a medium-sized plant found in stray cultivation throughout South India especially on the Malabar Coast where a few plants are grown in the back yards of some houses for the dual purpose of using the leaves as plates and the fruits for consumption. It takes about 13 months to mature from time of planting to harvest stage. It is not grown as pure stand anywhere and is not a chief commercial variety. The fruits have a tendency to crack if irrigation be continued after the fruits are ¾ full. It is a great drawback that precludes this variety being grown together with other varieties under irrigation. It is largely grown as a rain-fed crop on the Malabar Coast ; the fruits are delicious but at the expense of size.

Stem yellowish green, 13¼ feet high, circumference at base 28 inches. Leaves linear oblong, polished, glaucous beneath, leathery ; petiole 20½ inches long, circumference 4½ inches, light green ; margin of petiole deep red to 1/6 inch broad ; channel of petiole 1/3 inch broad, 3/4 inch deep ; lamina 7¾ feet long, 26¼ inches broad ; lamina base, right side 2¾ inches short, slightly cordate, but when stretched out truncate, left side cordate, but when stretched out nearly truncate ; apex of lamina right side truncate, left side 80° ; number of leaves 37 with an average monthly emergence of 3. Shot blades 2, bottom 43 inches long, lamina portion 31½ inches long,



NEY POOVAN



POOVAN

18 inches broad ; top 24½ inches long, lamina portion 5 inches long, 2 inches broad ; distance between the 2 shot blades 12½ inches. Inflorescence, peduncle 7 inches long, position of mature bunch 55 degrees to the stem; it has female, persistent male for 4 to 8 hands and then deciduous male flowers ; fertile axis 1½ feet long, deciduous male portion 1½ to 1¾ feet long. Bract outside purple, glaucous, inside bright red with large uniform pits in rows up to ½ the length of the bract towards base, ovate, broadest towards base ; 21·3 centimetres long, 15·2 centimetres broad ; apex rounded. Flowers persistent male for 3 to 8 hands and then deciduous male, one deciduous male flower had 2 perigonia and 2 scales while the rest have only one in each ; 7·5 centimetres long, 5 millimetres broad, 1·4 centimetre deep. Calyx (perigonium) 5·5 centimetres long, 1·5 centimetres broad ; keels 2, indistinct, outside reddish white, inside whitish red ; margins membranous ; lobes 5, 3 large ones alternating with 2 small, yellowish. Petal (scale) 3 centimetres long, 2·2 centimetres broad, deeply boat-shaped, membraneous with very light reddish tinge, 2-ridged towards apex and one ridge on the apex when it is straight ; 2-ridged when the apex is bent inside, acuminate and yellowish. Stamens 5, whitish, 5·8 centimeters long, overtopping style and, stigma ; filament 3·3 centimetres long, whitish ; anther 2·5 centimetres long, white ; anther valves greyish. Pistillode including stigma 5·2 centimetres long, style 4·5 centimeters long, whitish ; stigma yellowish with 5 distinct stigmatic lobes. Ovary persistent in the bottom 3 to 8 hands and then deciduous, ivory coloured with red tinge towards base, 2·5 centimetres long. Wrist about ½ inch broad near the base ; pedicel one inch long, nearly terete with 5 indistinct ridges at unequal distances ; hands 8 to 10, fruits up to 14 in a hand ; fruit 3½ inches long, circumference 3¾ inches, terete, with 2 or 3 indistinct ridges ; fruit tapers to apex, apex ¼ inch long, nearly terete with 3 to 4 indistinct ridges ; 100 to 150 in a bunch ; fruits drop off rather easily from the pedicel ; rind when ripe yellow, very thin ; pulp pure white, very sweet with good flavour.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *neypoovaniana* Jacob. Petioli margines rubro colore ; latus dexterum ad basim laminae sinistro 2¾ inch. brevius ; basis cordata, truncata quum extenditur ; fructus teres ; pellislenis ; caro alba, suavissima.

POOVAN

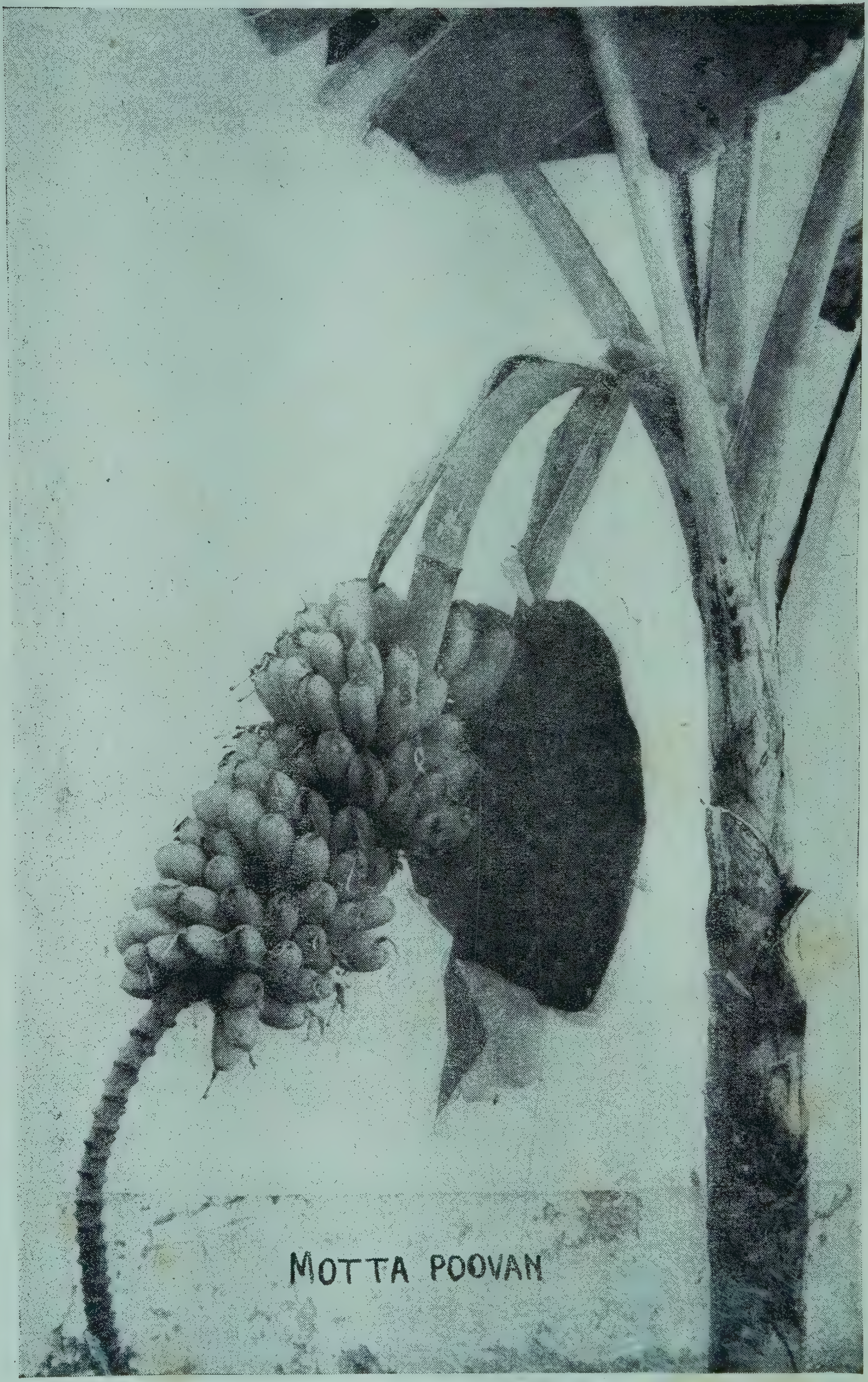
Poovan.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *poovaniana* Jacob.

Local names.—Madras (Tamil) *Adukku namarai*, *Dorai vazhai*, *Erode poovan*, *Kadali* (Tirunelveli), *Kallattu vazhai*, *Kari vazhai* ;

(Mettupalayam, Coimbatore), *Korangu vazhai*, *Poovan Poo vazhai*, *Pulichan kadali*, *Navarai*, *Pulippu kai*; (Telugu) *Ginni*, *Bengala*, *Karpura*, *Karpura chakkarakeli*, *Rasthali* (Krishna), *Salem Chakkarakeli* (West Godavari), *Sugandam*, *Vaasana chettu*, *Yerra aratti* (Chittoor), *Yerra sugandam*; (Kanarese) *Cheena bale*, *Huli bale*, *Kari bale*, *Kari goddi*, *Kari puttu bale*, *Kari rasa bale*, *Mysore bale*, *Mysore kadali*, *Mysori*, *Nanjangud bale*, *Othurasa bale*, *Vilayathi bale*; (Malayalam), *Cheru kai*, *Mysore poovan*, *Palayangodan*; (Hindustani) *Soan mowze*; Ceylon—*Embul hondara wala*, *Puwalu*; Bombay—*Lal velchi*; Malaya—*Pisang brok-bakul.*

It is a tall and stout variety with large leaves and a heavy bunch of fruits. It is the commonest commercial variety cultivated throughout the Madras province. It is hardy and thrives well up to an elevation of 5,000 feet. The taste and flavour vary considerably with the treatment given and the altitude where it is grown. Bunches with a maximum of 350 fruits are not uncommon. It takes about 13 months to mature from time of planting to harvest stage. It is comparatively of recent introduction into South India. This fact is clear from the various local names connoting the places wherefrom it was introduced, viz., *Bengala*, *Salem*, *Mysore*, *Palayamkodan* and other names. It has good keeping quality and stands transport well. There is great scope for this variety to be grown extensively for purposes of internal trade. The fruit has a tendency to become subacid when grown under irrigation and this subacid taste is liked by some Indians especially Telugus who prefer it even to *Rasthali*. The unripe fruits are used for culinary purpose by the people of the Malabar Coast. The fruits produced under rain-fed condition, viz., in the slopes of the Nilgiris and the Pulnis and throughout the Malabar Coast are free from sour taste and in favour with Europeans and other foreigners. They are good for making banana " figs ".

Stem tall, stout, greenish with purplish tinge, 9 to 11 feet high, circumference at base 2 feet. Leaves large, oblong, polished; petiole 21 inches long, circumference in the middle $4\frac{1}{2}$ inches, purplish green; channel of petiole $\frac{1}{2}$ inch broad, one inch deep, margins of petiole deep red to 1/6 inch broad; lamina 7 feet long, 30 inches wide; lamina base right side $1\frac{1}{4}$ inch short, slightly cordate, left side nearly truncate and abruptly acute; apex of lamina right side truncate, left side $\frac{3}{4}$ right angle and oblique; number of leaves 30 with an average monthly emergence of 4. Shot blade 2, bottom 23 inches long, the lamina portion 7 inches long 5 inches broad; top 13 inches long, $5\frac{1}{4}$ inches broad; distance between the 2 shot



MOTTA POOVAN

small; blades 13 inches. Inflorescence, peduncle glabrous, 18 inches long, position of mature bunch 50° to the stem. It has female and deciduous male flowers only; fertile axis 1½ to 2½ feet long; deciduous male 2 to 3 feet long. Bract 20·3 centimetres long, 12·2 centimetres broad, deep purple and glaucous outside, dark red and polished inside; apex rounded. Flowers deciduous male, 6·5 centimetres long, 9 millimetres broad, 7 millimetres deep. Calyx (perigonium) 4·6 centimetres long, 1·8 centimetres broad, white with red tinge outside, reddish white inside, lobes 5, 3 large and 2 small alternating, yellow, keels 2, not prominent. Petal 2·3 centimetres long, 2·1 centimetres broad, scarious, 3 ridges near the apex; apex bent inside, small, acute. Stamens 5, white, 4·1 centimetres long; filament 1·7 centimetres long. Pistillode, style and stigma overtopping stamens, style and stigma 4·8 centimetres long, white with reddish spots near the stigma, stigma yellowish, indistinctly 6 lobed. Ovary 2·1 centimetres long, greenish-yellow with reddish tinge. Pedicel ½ to ¾ inch long, 4 to 5-unequal sided, 4 to 5-ridged, 3 ridges prominent; hands very compact, 8 to 12, fingers very compact, 11 to 18 in a hand, terete, cylindric, 4 to 5-ridged, 2 ridges rather prominent, 3½ to 4 inches long, 4½ to 4¾ inches in circumference, 120 to 250 in a bunch; apex distinct, 1/3 to ½ inch long, 4 to 5-unequal sided, 4 to 5-ridged; ripe fruits do not easily drop off from the pedicel; rind when ripe yellow, medium thick; pulp cream-coloured, sweet or slightly subacid with fairly good flavour. It is sometimes used also for cooking purposes. Weight of bunch 25 to 40 lb.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *poovaniana* Jacob. Plantae altae robustae racemis gravibus; varictas robustor ubique bene se habens; truncus purpureo-vividis; latus dexterum ad laminae basim 1¼ inch sinistro brevius; basis cordata; adsunt flores feminei atque decidui flores masculini lantum. Fructus teretes; caro suavis et sub-acida.

MOTTA POOVAN

Motta poovan.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *poovaniana* Jacob forma *mottapoovaniana* Jacob.

Local name.—Madras (Tamil) *Motta poovan* (Coimbatore)

It is a tall and stout plant similar to Poovan. It is a sport of *Poovan* and differs from it in the absence of apex in fruit. It has been seen only at Aduthorai in the Tanjore district. Because of the absence of apex the fruit looks short; consequently it has not got as much commercial importance as the mother plant *Poovan*. Taste and flavour of the ripe fruit are identical with *Poovan*.

Description of the plant, leaf and flower same as *Poovan.*

LATIN.—*Musa sapidisiaca,* K. C. Jacob nom. nov. var. *poovaniana* Jacob forma *mottapoovaniana* Jacob. Sport of *Poovan*; a qua differt absentia apicis in fructu.

THIRUVANANTHAPURAM

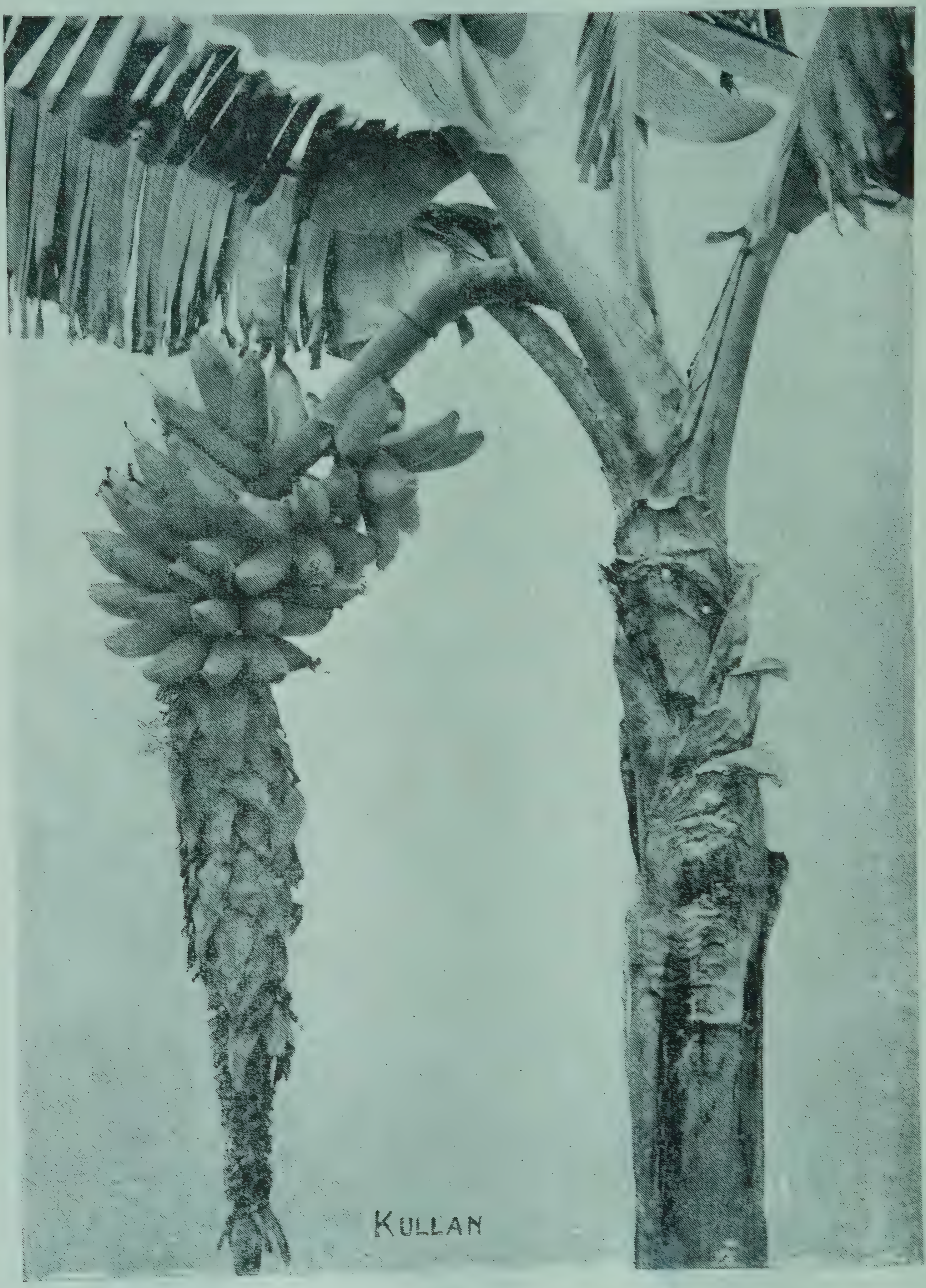
Thiruvananthapuram—Musa sapidisiaca K. C. Jacob. nom. nov. var. *granulata* Jacob.

Local name.—Madras (Malayalam) *Thiruvananthapuram.*

It is a medium-sized plant grown in the Agricultural Farm, Trichur, Cochin State. The colour of the "heart" is light purple and not dark purple as in other varieties. It takes about $13\frac{1}{2}$ months to mature from time of planting to harvest stage. It is believed to have been introduced from Malaya. This variety, amongst those of fruits consumed when ripe, has the largest "heart." The pulp of the flecked fruit is granular and delicious. It requires heavy doses of manure to prevent deterioration.

Stem yellowish green, $11\frac{1}{2}$ feet high, circumference at base 28 inches. Leaves broadly elliptic, polished above and slightly glaucous below, leathery; petiole greenish yellow, 16 inches long, $4\frac{1}{2}$ inches in circumference; channel of petiole $\frac{3}{4}$ inch deep, $\frac{1}{2}$ inch wide; margin of petiole red to $\frac{1}{8}$ inch broad; lamina $7\frac{1}{4}$ feet long, 28 inches broad; lamina base, right side equal to left side, both sides slightly cordate; apex of lamina right side truncate, left side $\frac{3}{4}$ right angle; number of leaves 29 with an average monthly emergence of 4. Shot blades 2, bottom 43 inches long, lamina portion 32 inches long, $20\frac{1}{2}$ inches broad; top 25 inches long, lamina portion 5 inches long, $2\frac{1}{2}$ inches broad; distance between the two 8 inches long. Inflorescence, peduncle glabrous, 2 feet long, position of mature bunch 30° to the stem. It has female and deciduous male flowers only; fertile axis $1\frac{1}{2}$ feet long, deciduous male region 2 feet long. Bract outside purple, lightly glaucous, inside dark red with pits in longitudinal lines confined to middle $\frac{3}{4}$ area, ovate oblong, 21·5 centimetres long, 15 centimetres broad; apex rounded. Flower deciduous male, 7·5 centimetres long, 1·1 centimetre broad, 1·1 centimetre deep; calyx (perigonium) 5·2 centimetres long, 1·5 centimetre broad; margin hyaline; calyx outside yellowish, inside deep cream-coloured; lobes 5, 2 very minute alternating with 3 fairly large ones; lobes yellowish; keels 2, not prominent. Petals (scale) 2·5 centimetres long, 2·5 centimetres broad bowl shaped, slightly compressed; margins bent inside towards apex as also the apex, cream-coloured; ridges one to two second, if present, very small,

TIRUVANANTHAPURAM



KULLAN

apex acute, small, most cases bent inside, cream-coloured ; hyaline. Stamens 5, 5 centimetres long, slightly overtopping the stigma ; filament 2·7 centimetres long, light cream-coloured, flat, straight ; anther 2·3 centimetres long, bent outwards, cream-coloured ; anther valves dark grey, pollen present. Pistillode 5 centimetres long ; style 4·5 centimetres long, whitish, straight, slender ; stigma yellowish brown, lobes 5, indistinct. Ovary deciduous, 2·2 centimetres long, greenish yellow, 4 to 5-unequal sided, tapers to base. Pedicel ½ inch long, 5-unequal sided, 5-ridged, 3 ridges prominent ; hands rather sparsely set, 8 to 9 ; fingers loosely set, 12 to 13 in a hand ; terete, 5-ridged, 2 ridges prominent, 5½ inches long, 4½ inches in circumference, about 70 to 90 in a bunch ; apex distinct, ½ inch long, 5-ridged, 3 ridges prominent ; rind medium thick, ripening golden yellow, pulp light orange in colour, granular, sweet. Fruits do not easily drop off from the pedicel.

LATIN.—*Musa sapidisiaca* K. C. Jacob var. *granulata* Jacob. Liminae bases aequales, basis cordata ; "heart" leniter purpureo colore, non, ut in aliis vari etatibus, purpureo sub-nigro colore. "Heart" amplum etiam ipso tempore maturitatis fructuum ; fructus maturi aures-flavo colore ; caro leniter aurantiaca, granulata. (Caro fructus maturi granulator, unde nomen hujus varietatis secundum hauc notam dare cupio).

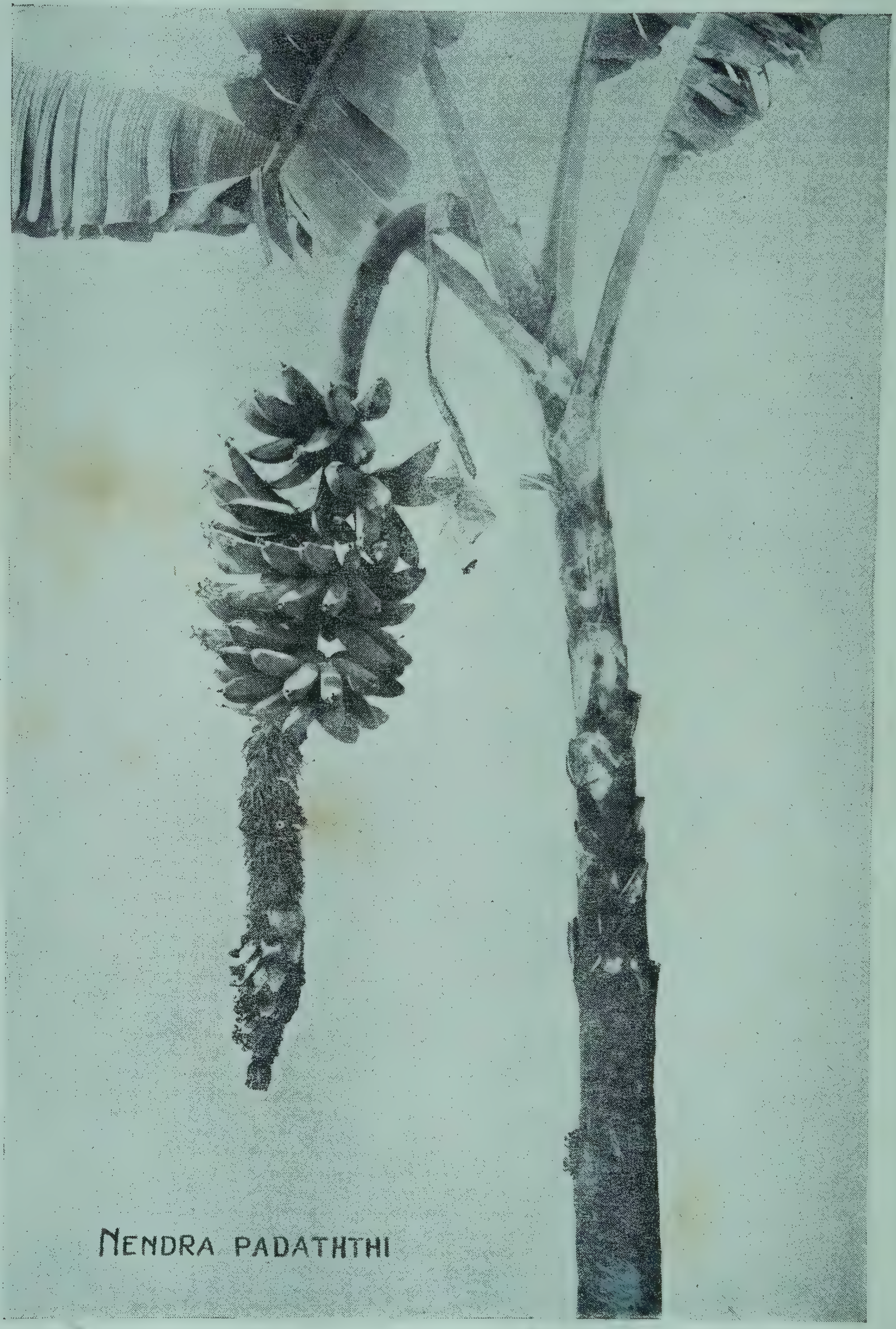
KULLAN

Kullan.—Musa sapidisiaca K. C. Jacob; nom. nov. var. *kullaniana* Jacob.

Local names.—Madras (Tamil), *Kullan*, *Kuzhi valai* ; (Coimbatore), *Ther vazhai* ; (Telugu), *Chakkarakeli* ; (Guntur), *Rasa aratti*, *Yenuga aratti* ; (Kanarese), *Aana guja bale* ; Bombay—Wala (Kirkee).

It is a very short and robust plant, slightly taller and stouter than *Vamanakeli*. The leaves are short and very broad and also closely set. The bunch of fruits is medium-sized. This differs from *Vamanakeli* in the stem being light green in colour with the fruits 5-sided and the stamens poorly developed and dark in colour. This variety does not occur on the Malabar coast. It takes about 16 months to mature from time of planting to harvest stage. This being a very short and stout plant requires no prop. The ripe fruits easily drop off from the pedicel. The bunches are not compact. These features militate against this variety acquiring commercial importance.

Stem short, stout, greenish yellow with dark brown blotches at the top of the leaf sheath, 5 to 5½ feet high, circumference at base 22 to 25½ inches. Leaves ovate oblong, glabrous above, slightly glaucous below, brittle ; petiole yellowish green, glaucous, up to 10 inches long, short, stout, broadly winged, the wings slightly revolute ; channel of petiole broad, one to 1¼ inch wide and one to 1¼ inch deep and up to 5 inches in circumference, margin of petiole with a dark line ; lamina base unequal, right side ½ inch short and both sides deeply cordate ; midrib stout, light green and glaucous ; margin of lamina with a dark line, leaf blade 4½ to 5 feet long, 23 to 25¼ inches broad in the middle ; number of leaves 31 with an average monthly emergence of 3. Shot blade 2, bottom 4½ feet long with the lamina portion 2¼ feet long and 1¼ feet broad, top 16 × 3 inches, distance between the two is 1½ feet. Inflorescence, peduncle glabrous, 13 inches long, position of mature bunch 60 to 70° to the stem. It has female and persistent staminate flowers only, persistent staminate portion is 2¼ feet long. Flowers : (female flowers are not considered here) bract persistent, colour outside purple and glaucous, colour inside red with yellowish blotches on one side with pits in lines especially towards the centre, 26 centimetres long, 19 centimetres broad ; apex rounded. Flower, persistent male, 7 centimetres long, 6 millimetres broad, one centimetre, deep. Calyx (perigonium) 4·3 centimetres long, 1·9 centimetres broad, margin scarious and cream-coloured, reddish white outside, whitish red inside, number of lobes 5, 2 small alternating with 3 large, yellowish, keels 2, prominent in the outer series. Petals (scale) 2 centimetres long, 2·3 centimetres broad, bowl shaped, semi-transparent with red spots inside and red bands on either side towards margin ; number of ridge one, prominent ; apex acuminate, straight, number of ridge one, yellowish, not prominent. Stamens 5, 2·8 centimetres long, much shorter than stigma, filament one to 1·3 centimetre long, white with red tinge, flattened with a groove inside, much shorter than anther ; anther 1·7 centimetres long, bent, often dark and poorly developed ; anther valves dark ; pollen not present. Pistillode 6·4 centimetres long ; style 3·3 centimetres long, whitish with red spots, erect ; stigma yellowish, number of lobes 3, distinct. Ovary persistent 2·5 centimetres long, light green with red blotches towards base inside, 4 to 5-sided, thick. Wrist ½ inch broad towards the base, glabrous ; pedicel ½ inch long, 4 to 5-sided, 4 to 5-ridged ; hands not compact, 6 to 8 ; fruits spreading, 11 in a hand, tendency for the fingers in the lower side of the bunch is to curve up, 4 to 5-sided, one side convex, 4 to 5-ridged, all ridges prominent ; 4¼ to 4½ inches long, 4½ to 5½ inches in circumference, 65 to 90 in a bunch, very easily dropping off from the pedicel ; apex somewhat distinct, ¼ to ½ inch



NENDRA PADATHTHI

long, 4 to 5-sided, 2 to 3 sides concave, 4 to 5-ridged, 3 to 4 ridges prominent. In some fruits marcescent perianth and style persistent; latter accrescent in some to ⅓ inch long; rind when ripe yellow, thick, breaking when peeling; when overripe, turns dark brown; pulp, cream-coloured with 3 yellowish cells, not very soft, sweet, acidulous, similar to that of *Vannan*. Bunch weighs 20 to 25 lb. It is not used for cooking purposes. Sometimes a few fingers in one or two hands remain partially developed.

LATIN.—*Musa sapidisiaca*, K. C. Jacob vom. nov. var. *kullaniana Jocob* truncus brecisimus et robustus; folia brevia latissima presse inserta; petiolus late apertus; laminae bsis cordata; bracteae marcidae persistunt; racemi non conferti; fructus 5-laterafer in maturityte fasile decidentes.

NENDRA PADATHTHI

Nendra padaththi—*Musa sapidisiaca* K.C. Jacob nom. nov. Var. *nendrapadaththiana* Jacob.

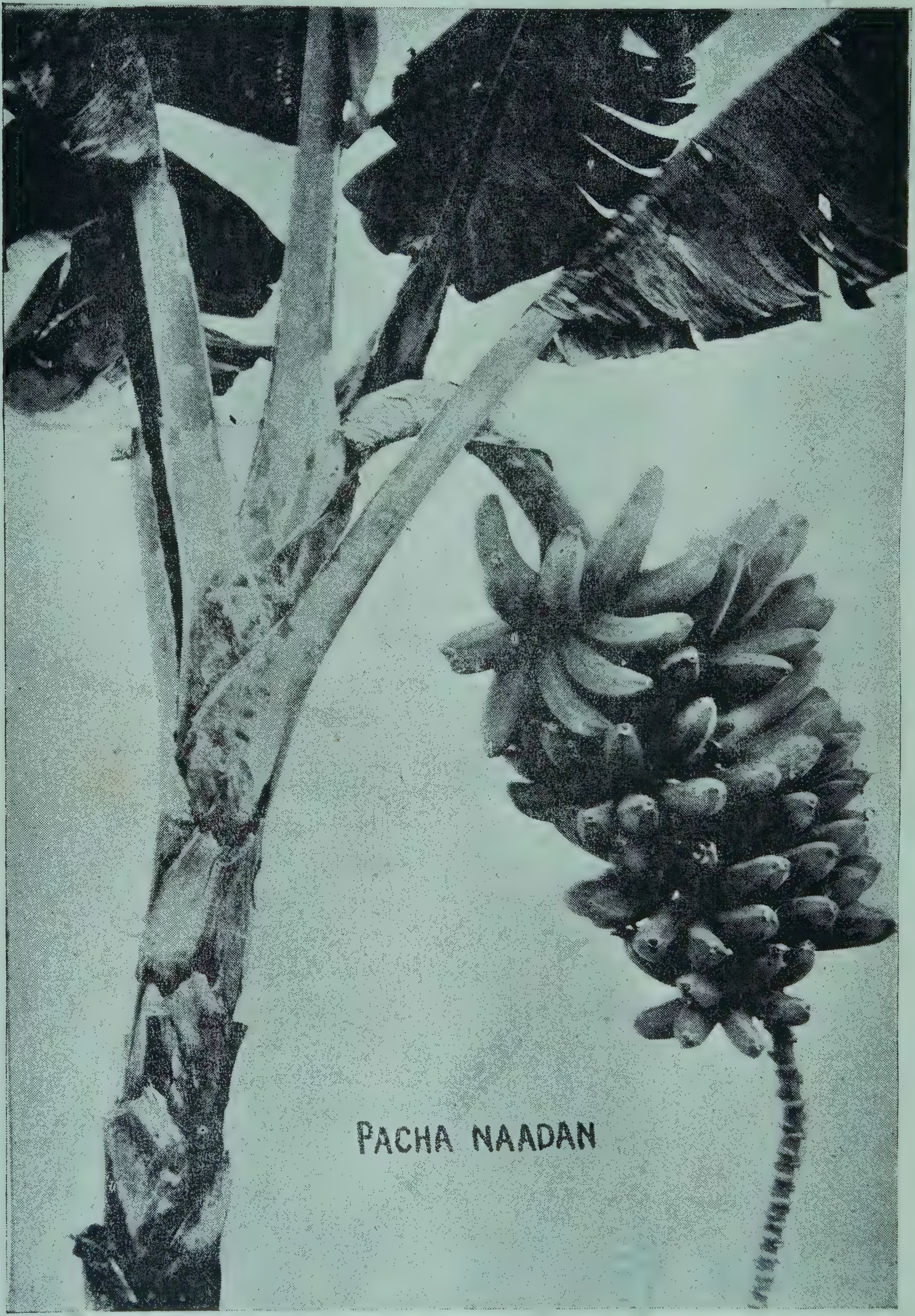
Local names.—Madras (Malayalam) *Kuthiravalan*, *Nendra padaththi*, *Nendra vannan*.

It is a tall and stout plant peculiar to the Malabar coast of the Madras province. The withered bracts often fall off unlike in *Kullan*. The marcescent perianth and style are attached to the ovary of the persistent male flowers. The fruits resemble *Pachanaadan* in all respects except in the marcescent perianth and style persisting. It takes 12½ months to mature from time of planting to harvest stage. It is a rare variety found in stray cultivation in a few places on the Malabar coast. It is elegant when in bunch. The large bunch and the big fruits give it a claim for wider growth.

Stem tall, stout, light green and glaucous with purplish blotches, 9½ to 12 feet high, circumference at base 27½ to 30 inches. Leaves oblong, leathery, slightly brittle, smooth and green above, glaucous below; petiole greenish yellow, glaucous, 15½ to 22 inches long; channel of petiole one to 2½ inches wide, ½ to 1¼ inch deep and 4 to 7½ inches in circumference in the middle; margins of petiole red, ½ inch wide; lamina base unequal, right side shorter by one to 1½ inch, obtuse, left side cordate; lamina tip right side truncate, left side 50°; midrib stout, greenish yellow, margin of lamina with a dark red line; leaf blade 5½ to 7¼ feet long and 2 to 2½ feet broad in the middle. Number of leaves 31 with an average monthly emergence of 4, of which 9 arise from the central axis and the rest from the rhizome. Shot blade 2, bottom 5½ feet long with the lamina portion

43½ inches long and 20¼ inches broad; top 3¼ feet long with the lamina portion one foot by ¾ foot; distance between the bottom and top ones 2 feet. Inflorescence, peduncle glabrous, 15 inches long, position of mature bunch 40°. It has only female and persistent male flowers; length of fertile axis 19 to 23 inches and the persistent male portion of the axis 27 to 30 inches long. Heart ovate, acute; bracts persistent, older bracts often drop off, obtuse, light purple outside and glaucous; deep red inside. Bract semi-persistent, colour outside deep purple, glaucous and longitudinally prominently grooved, inside red and slightly shining, ovate, 21·5 centimetres long, 16 centimetres broad; apex rounded with a mucro and broken. Flower persistent male, 6·6 centimetres long, 5 millimetres broad, 7 millimetres deep. Calyx (perigonium) 4·6 centimetres long, 1·8 centimetres broad, margin hyaline and cream-coloured, calyx outside reddish white, inside red with white blothes; number of lobes 5, two small alternating with three large; number of keels 2, rather prominent. Petals (scale) 2·3 centimetres long, 2 centimetres broad, rolled up or sides overlapping, semi-transparent, pinkish white, number of ridges 2, prominent; apex acuminate, straight, number of ridge one, yellowish. Stamens 5, 3·2 centimetres long, much shorter than the stigma; filament 1·3 centimetre long, white with reddish tinge, flat and grooved, with a distinct bend at junction of the filament and anther; anther 1·9 centimetres long, 1·4 centimetre long, dark, poorly developed; anther valves dark, pollen not present. Pistillode 6·6 centimetres long; style and stigma 4·3 centimetres long, style white, stout towards base and erect; stigma yellow, number of lobes 5, distinct; ovary persistent, 2·3 centimetres long, greenish white, 4 to 5-unequal sided, medium thick, tapering towards base; wrist ¾ inch broad towards the base of bunch and disappearing towards the top, glabrous; pedicel ¾ to one inch long, 4 to 5-sided, ridges not prominent. Hands loose, 7 to 8. Fruits erect, slightly spreading, 12 to 16 in a hand, tendency for the fingers in the lower side of the bunch to curve up, 4 to 5-unequal sided, 4 to 5-ridged, 8 inches long, 5 to 5½ inches in circumference, 85 to 115 in a bunch, dropping off easily from the pedicel, fruit tapers to apex, perianth and style persistent though dried up in some fruits; skin dull yellow with brown spots when ripe, thick, but not so thick as *Pacha nadan*. When overripe, brown spots change to dark blotches. Pulp light cream-coloured, not very soft; not very sweet, not considered a superior fruit. Bunch 30 to 45 lb. in weight.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *nendrapadaththiana* Jacob. Truncus altus, pinguis; perianthus marcescens silique florum masculorum persistunt. Adsunt flores feminei et persistentes flores masculini tantum; antherae fusco colore;



PACHA NAADAN

fructus sparsi inaequaliter 5-laterales; fructus maturi facile a petiolo decidunt.

PACHA NAADAN

Pacha naadan.—*Musa sapidisiaca* K. C. Jacob. nom. nov. var. *pachanaadaniana* Jacob.

Local names.—Madras (Tamil) *Erode naadan*, *Kadali* (Mayuram, Tanjore), *Kali* (Tiruchirappalli), *Kal kadali*, *Korangu laadan*, *Laadan*, *Ladda*, *Naadan*, *Nattu chingan*, *Pacha naadan*, *Pacha naala*, *Pacha vazha*; (Telugu) *Bengala*, *Chakkarakeli* (Proddatur, Cuddapah), *Konda aratti*, *Malabar*, *Pacha aratti*, *Pacha laadan*; (Kanarese) *Belli baja*; (Malayalam) *Cheru vannan*, *Eradan*, *Mannan*, *Padaththi*, *Thekkan mannan*, *Thodan*, *Vannan* (Kozhikode), *Vella paadan.*

It is a large plant cultivated to a certain extent throughout the Madras province. It takes about 15 months to mature from time of planting to harvest stage. It is a commercial variety popular in Coimbatore and Tiruchirappalli districts. The erect nature of the fruits on the bunch militates against easy transport. The large size of the bunch and fruits, however, recommend it for popular adoption in cultivation.

Stem greenish yellow with large dark blotches especially near base of petiole, glaucous, 9½ feet high, circumference at base 26 inches. Leaves linear oblong, slightly glaucous, leathery; petiole greenish yellow, slightly glaucous, 20 inches long, circumference 5 inches, channel of petiole ¾ inches broad, ¾ inches deep; margin of petiole red to 1/8 inch broad, revolute in young plants towards the base of petiole; lamina 7¾ feet long, 26½ inches broad; lamina base right side 1¼ inches short, slightly cordate, left side very broadly obtuse or nearly truncate; apex of lamina right side truncate, left side 55°; number of leaves 35 with an average monthly emergence of 3 to 4. Shot blade 2, bottom 46½ inches long, lamina portion 36 inches long, 17½ inches broad; top 19½ inches long, lamina portion 2½ inches long, 1½ inches broad, distance between the two 12½ inches. Inflorescence, peduncle 15 inches, glabrous; position of mature bunch 30° to the stem. It has female and deciduous male flowers only; fertile axis 1¼ feet long, deciduous male region nearly 2 feet long. Bract outside purple, glaucous, inside deep red and shining, ovate, 20 centimetres long, 14·4 centimetres broad, apex rounded. Flower deciduous, 6·2 centimetres long, 5 millimetres broad, 8 millimetres deep; calyx (perigonium) 4·2 centimetres long, 1·8 centimetres broad, margin hyaline, light cream-coloured, calyx outside cream-coloured with 3 reddish longitudinal markings, inside reddish yellow;

lobes 5, 2 small alternating with 3 large, yellowish ; keels 2, fairly prominent. Petals (scale) 2·3 centimetres long, 1·8 centimetres broad, 2 edges nearly touching, semi-transparent, light cream-coloured, ridges 3, rather prominent ; apex acuminate, long, straight, yellowish. Stamens 5, 3·2 centimetres long, much shorter than pistil ; filament 1·5 centimetres long, whitish with a greenish tinge towards base, flat or with a deep groove and with a bent at the junction of the filament and anther ; anther 3·2 centimetres long, slightly of varying length, not developing, dark ; anther valves dark. Pistillode 6 centimetres long, style 4·1 centimetres long, whitish, stout and erect ; stigma yellowish, lobes 6. Ovary deciduous, 2 centimetres long, yellowish green with red blotches towards top, 4 to 5-unequal sided, rather stout, thick towards top. Pedicel $\frac{3}{4}$ inches long, 4 to 5-unequal sided, 4 to 5-ridged, 4 ridges prominent ; hands rather loose, 6 to 7 ; fingers rather loose, 11 to 12 in a hand, 5-sided, one side rather convex; $5\frac{1}{2}$ to 6 inches long, $5\frac{3}{4}$ inches in circumference; about 60 to 80 in a bunch ; fruit tapers to an indistinct apex ; ripe fruits drop off easily from the pedicel ; rind very thick, greenish yellow or yellowish green when ripe according to altitude ; higher or cooler the place greener the colour of the ripe fruit ; pulp dull white, not juicy, sweet with medium flavour.

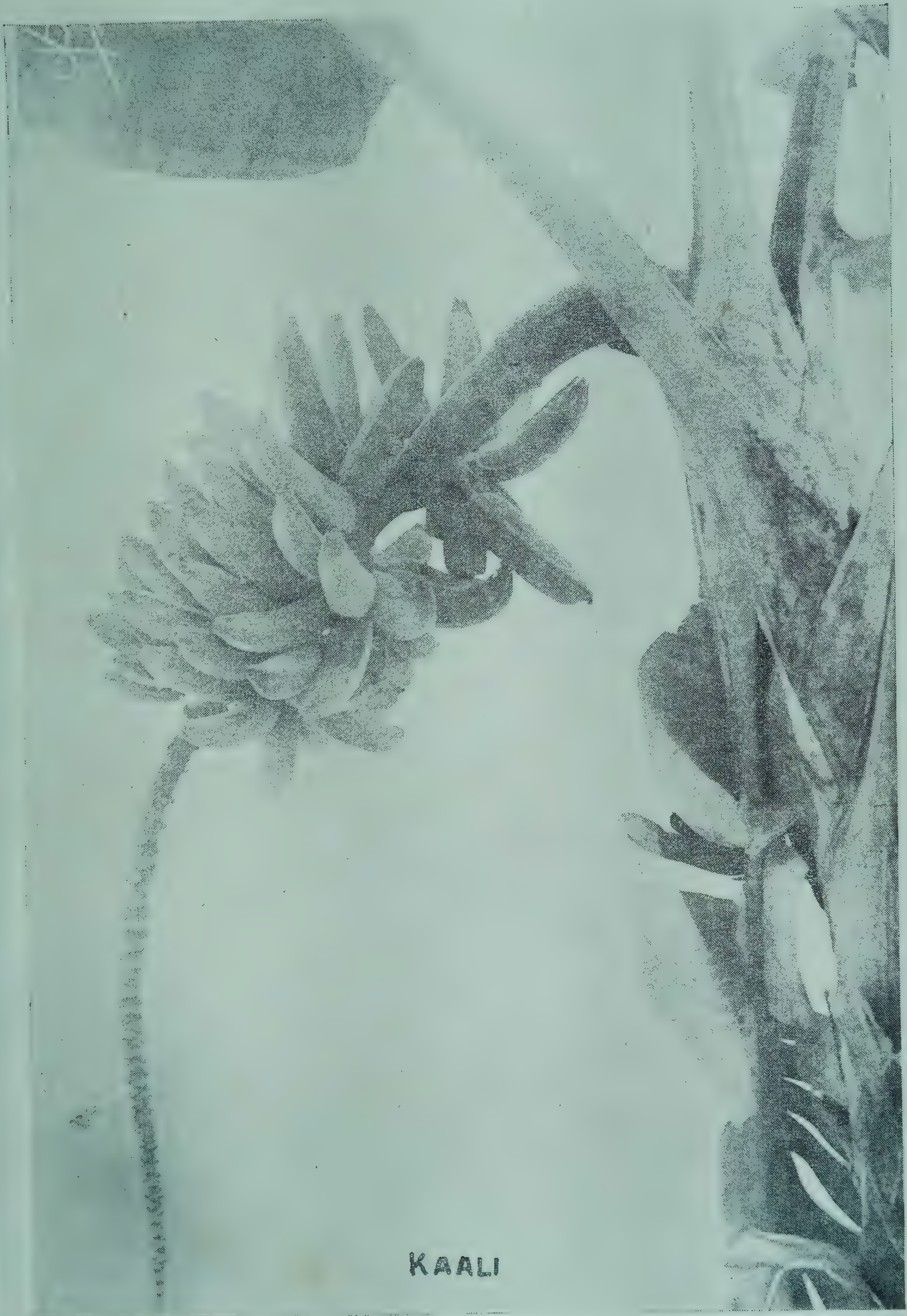
Latin.—*Musa sapidisiaca*, K. C. Jacob nom. nov. var. *pachanadaniana* Jacob. Petioli margines ad basim revoluti in plantis novellis rubroque colore ; antherae fuscas ; fructus fere sine apice, inaequaliter 5-laterales.

KAALI

Kaali.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *kaaliana* Jacob.

Local names.—Madras (Tamil) *Pacha naadan* (Tirunelveli), *Padaththi, Vellai chingan, Chingan* (Tirunelveli) ; (Telugu) *Pacha aratti, Thotta aratti* ; (Kanarese) *Cheena bale, Elakki bale, Gali bale, Janaka bale, Kaadu bale, Kal bale, Kai bale, Kaattu bale, Mara bale, Pacha bale* ; (Malayalam) *Kaali, Kuppa mannan, Mannan, Nattu mannan, Padachchi Kai, Padalu, Padaththi, Pada vazhai, Pakki, Potta Kaali, Thodan, Vannan* (Kalpetta), *Vella padan.*

It is a large plant found in stray cultivation on the West Coast districts of the Madras province. It takes about 13 months to mature from the time of planting to harvest stage. The shape and size of fruits resemble *Pacha naadan*, except for the distinct apex found in the *Kaali* fruit. It thrives well even without much attention in the hilly tracts of the Malabar Coast. It is believed to be the earliest



KAALI

banana variety in India. The colour of the rind of the ripe fruits produced in the high elevations is greenish yellow, due to the cold climate, while it is pale yellow in the plains. It deserves to be grown widely on account of the large size of bunch and fruit and also the hardy nature of the variety.

Stem yellowish green with purplish blotches, 16 feet high, circumference at base 34 inches. Leaves linear oblong, smooth above, glaucous below, leathery ; petiole yellowish green, glaucous, 25 inches long, circumference 4½ inches ; channel of petiole ¾ inch wide, ¾ inch deep ; margin of petiole red to 1/12 inch broad ; lamina 9 feet 7 inches long, 28½ inches broad ; lamina base right side almost equal to left side, both sides cordate, apex of lamina right side truncate, left side 50° ; number of leaves 29 with an average monthly emergence of 4. Shot blades 2, bottom 34 inches long, lamina portion 19 inches long, 13½ inches broad ; top 22 inches long, lamina portion 2 inches long, 1½ inches broad ; distance between the two 9 inches long. Inflorescence, peduncle 18 inches, slightly pubescent, position of mature bunch 30° to the stem. It has female and deciduous male flowers only ; fertile axis 1½ feet long, deciduous male region nearly 2 feet long. Bract outside deep purple, glaucous ; inside deep red and shining, 22·5 centimetres long, 15 centimetres broad ; apex rounded. Flowers deciduous male, 7·5 centimetres long, 6 millimetres broad, one centimetre deep Calyx (perigonium) 5·5 centimetres long, 1·8 centimetres broad ; keels 2, prominent, cream-coloured with reddish tinge ; lobes light yellow, 3 large alternating with 2 small. Petal (scale) half of perigonium, 2·5 centimetres long, 2·4 centimetres broad, bowl shaped, light cream-coloured, 2 very deep ridges ; apex acute, yellowish. Stamens 5, 3·9 centimetres long ; filament 1·7 centimetres long, cream-coloured ; anther 2·1 centimetres long, of this, 1·6 centimetres is dark in colour. Pistillode, style white with reddish spots, towards apex yellowish, 4·4 centimetres long ; stigma 4 millimetres long, lobes 3, distinct, yellowish. Ovary deciduous, yellowish with reddish tinge, 4 to 5-sided, 2·5 centimetres long. Pedicel ½ inch long, 4 to 5-unequal sided, 4 to 5-ridged, 3 ridges prominent ; hands rather loose, 6 to 7, fingers rather loose, 10 to 12 in a hand, nearly terete, 5-ridged, all ridges prominent, 5 inches long, 5½ inches in circumference, about 70 to 90 in a bunch ; apex distinct, 1/3 inch long, 4-unequal sided, 4-ridged, 3 ridges prominent, rind thick, ripening yellow, pulp cream-coloured, slightly juicy.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. Kaaliana Jacob. Varietas robusta ; plantae altae, pingues, gravibus racemis ;

bases laminae fere aequales, basis cordata. Apex folii latere sinistro 50° ad venam principalem. "Heart" quando fructus maturantur, exarescit; fructus cum a pice distincto.

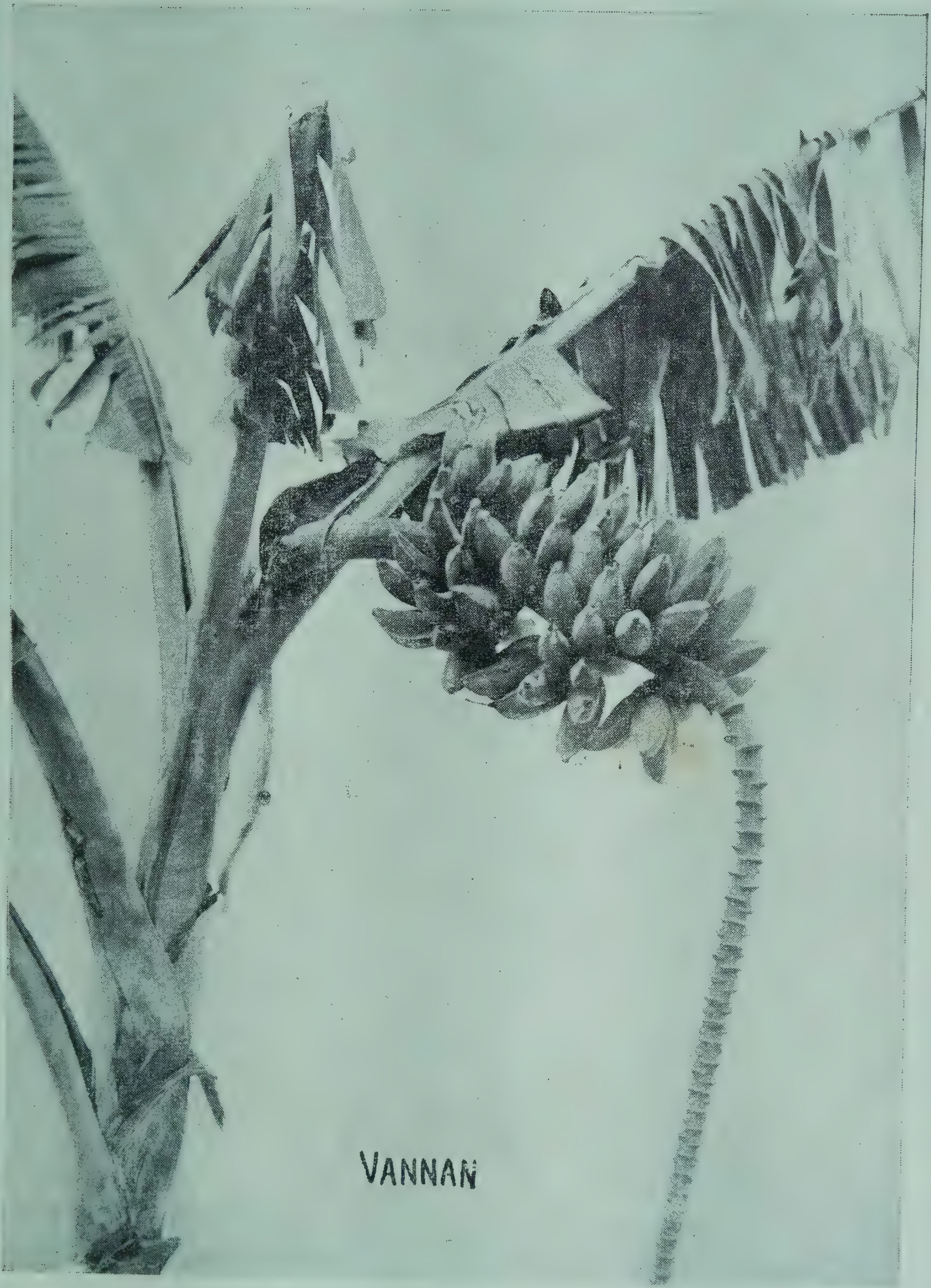
VANNAN

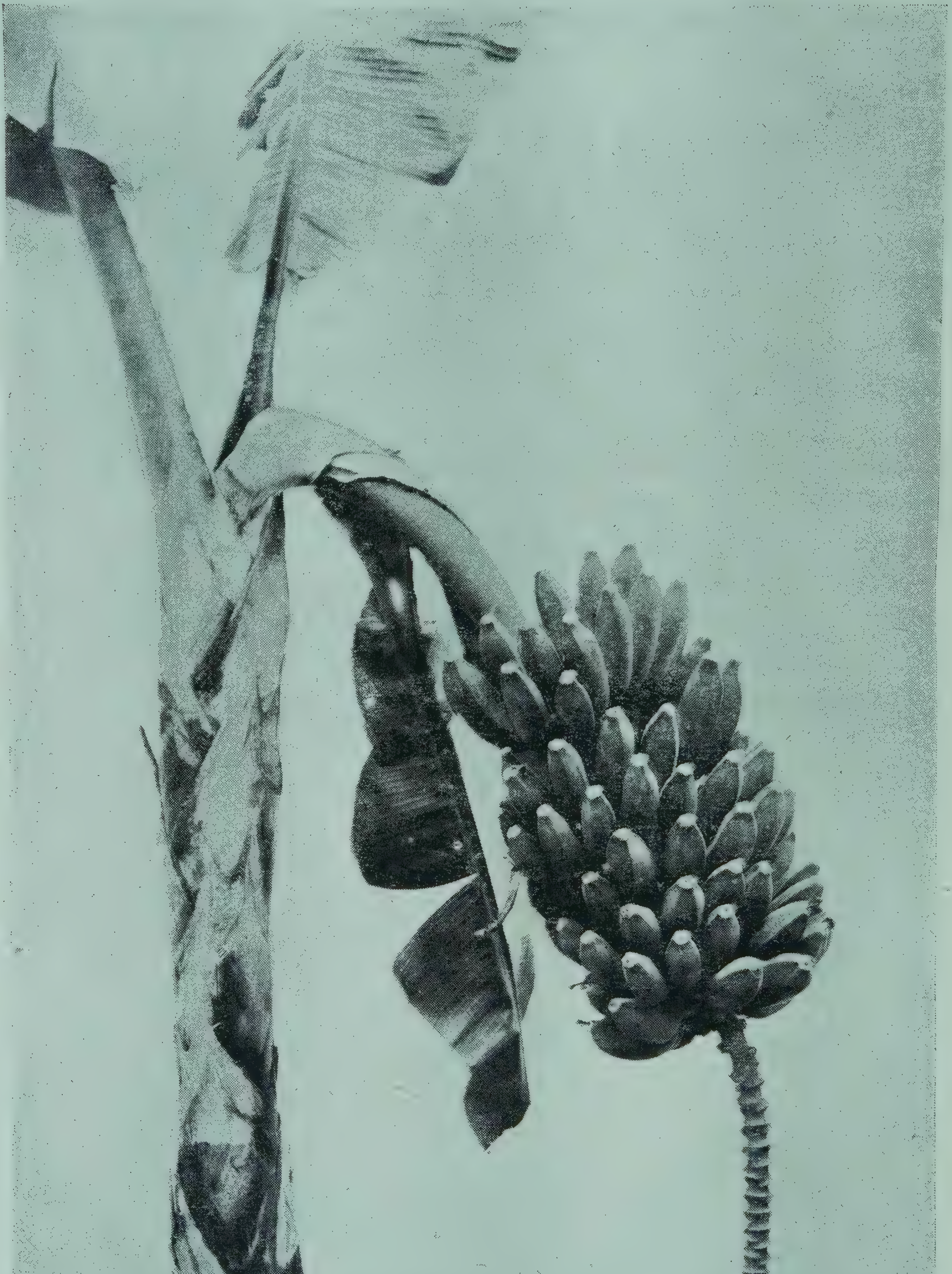
Vannan.—Musa sapidisiaca K. C. Jacob, nom. nov. var. *Vannaniana* Jacob.

Local names—Madras (Tamil) *Ethara vazhai*, *Kaali vazhai*, *Katta kaali*, *Korangu naadan*, *Korangu pacha laadan*, *Kozhikkootu vazhai*, *Ladan*, *Mala vazhai*, *Pacha ladan*, *Tenkasi mala vazhai. Udiri*; (Telugu) *Sugandham* (Chittoor); (Kanarese) *Kaadu bale*; (Malayalam) *Cheru vannan*, *Kaali thodan*, *Mundilapaadan*, *Mundi vella paadan*, *Padalu*, *Valia thodan*, *Vannan*, *Vannan eradan*, *Vannan kali*; Orissa—*Dacca martaban* : Ceylon—*Embul hondarawala*, *Poo valai*, *Puvalu*, *Watupalu.*

It is a tall and stout plant found in stray cultivation especially on the West Coast of the Madras province. When grown in different altitudes, the fruits have varying taste, flavour and keeping quality. The pulp of fruits produced at an elevation of 4,000 to 5,000 feet has a dry consistency with superior flavour. It takes about 14 months to mature from the time of planting to harvest stage. The erect position of fruits in the bunch which makes transport difficult and the easy dropping off of the fruit from pedicel in its ripe stage, discount the commercial importance of this variety; hence it is found in stray cultivation only. The rudimentary infertile seeds generally found in the pulp of bananas are absent in this variety and its eco-types.

Stem tall, greenish yellow with darkish blotches, 14 to 16½ feet high, circumference at base up to 3¼ feet. Leaves large, oblong, petiole 16 to 18 inches long, circumference in the middle 4½ inches, yellowish green; channel of petiole 1½ inches broad, 1¼ inches deep, margins of petiole red to 1/12 inch broad; lamina 9 to 9½ feet long, 27½ to 29½ inches broad; lamina base unequal, right side longer by ½ inch, but in eco-types *Sirumalai* and *Virupakshi*, it is ½ inch shorter, cordate, left side cordate, abruptly shortly acute; apex of lamina, right side truncate, left side ½ right angle; number of leaves 31 with an average monthly emergence of 4, but in eco-type *Sirumalai* and *Virupakshi* the number is 35. Shot, blades 2, bottom 39 inches long, the lamina portion 26 inches long, 14½ inches broad; top 22½ inches long, lamina portion 3½ inches long, 1¼ inches broad; distance between the 2 shot blades 10 inches. Inflorescence, peduncle glabrous, 22 inches long, position of mature


VANNAN



VIRUPAKSHI

bunch 50° to the stem. It has female and deciduous male flowers only; length of fertile axis 12 to 16 inches; length of deciduous male region 2½ to 3 feet. Bract outside dark purple, glaucous, inside deep red, margins dark red and shining, 21·3 centimetres long, 14·4 centimetres broad; apex rounded. Flower deciduous male, 7 centimetres long, 0·6 centimetre broad, 1·1 centimetre deep. Calyx (perigonium) 4·6 centimetres long, 0·9 centimetre broad, outside whitish with 3 pinkish bands; margins hyaline, inside whitish with 3 reddish bands; number of lobes 5, 2 small alternating with 3 large, yellow, keels 2 in the lower series and none in the top series. Petals (scale) 2·5 centimetres long, 2·1 centimetres broad, boat shaped, the 2 sides bent up, number of ridges 4, prominent; apex acute, yellowish, erect. Stamens 5, 3·8 centimetres long, much shorter than stigma, 1·8 centimetres long, whitish, channeled (with a groove), abruptly bent at the junction of the filament and anther; anther 2 centimetres long, tapers to apex, turning dark, anther valves dark. Pistillode 6·7 centimetres long, style and stigma 4·4 centimetres long, style white with pinkish tinge, stigma yellowish; number of lobes 3, prominent. Ovary deciduous, 2·3 centimetres long, greenish white with red blotches, tapers to base, 5-unequal sided. Pedicel of fruit ½ to ¾ inches long, 5-unequal sided, 5-ridged, 3 prominent; hands rather loose, 6 to 8; fingers rather loose, 14 in a hand, unequally 5-sided, 5-ribbed, 2 ribs prominent, 5 inches long, 5¼ inches in circumference; apex 1/3 to ½ inch long; fruit tapers to apex, 5-unequal sided, 5-ribbed, 2 ribs prominent; fruits easily drop off from the pedicel; 70 to 90 in a bunch; rind when ripe yellowish, thick, turns dark when very ripe; pulp cream-coloured, sweet with good flavour. Exclusively used as dessert fruit; weight of bunch 20 to 25 lb.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *vannaniana* Jacob. Truncus altus, pinguis; latus dexterum laminae ad basim ½ inch longius sinistro; basis cordata; folii apex latere sinistro 45° ad venam principalan; fructus 5-laterales; apex vix ullus; fructus maturi facile a petiolo decidunt.

VIRUPAKSHI

Virupakshi.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *vannaniana* Jacob eco-type *virupakshiensis* Jacob.

Local names.—Madras (Tamil) *Vella vazhai, Virupakshi.*

It is a tall and stout plant similar to *Vannan.* It is an eco-type of *Vannan* but differs from it in the following characters:—The colour of ripe fruit yellowish green, when over ripe it turns dark ; fruits do not easily drop off from the pedicel. It has very good keeping quality and can be safely kept for a fortnight after ripening. The pulp is rather dry and is sweeter and richer in flavour than *Vannan.* It is extensively cultivated in the Pulney Hills of the Madurai district at an elevation of 4,000 to 5,000 feet as shade plants in citrus and other plantations. Virgin forest lands are cleared, pits dug in rows, 10 to 12 feet apart either way and banana suckers are planted at the commencement of the monsoon. After a few months citrus or coffee seedlings are planted in rows between the bananas so that the latter may serve as shade plants. All the suckers of the banana plants are periodically removed with rhizomes except one for the next generation, besides all dead and old leaves. Only 6 or 7 leaves are left on a plant to give the required amount of shade. The 'hands' are cut off from the bunch with a circular bit of the axis and transported either loose or packed in cheap baskets. This variety when grown in the plains at Coimbatore and other places loses its delicacy of taste and richness of flavour and becomes identical with '*Vannan.*' The fruits also easily drop off from the pedicel and the keeping quality is lost.

The description of stem, leaf, flower and fruit same as *Vannan.*

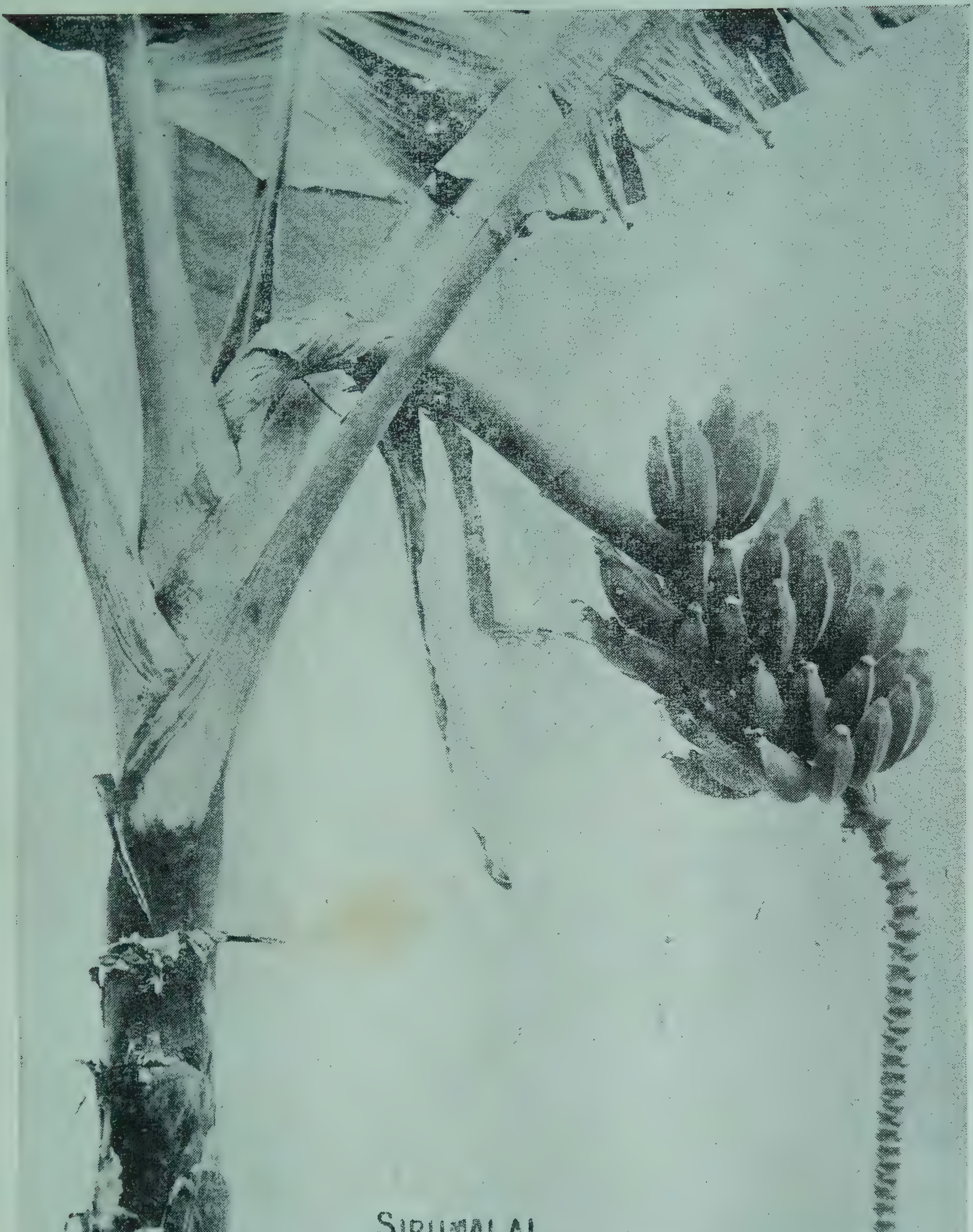
Latin.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *vannaniana* Jacob eco-type *virupakshiensis* Jacob. Ecotypus of *vannan* ; crescit altitudine 4,000—5,000 feet pedum ; laminae latus dexterum ½ inch sinistro brevius ; basis cordata ; fructus maturi per duas hebdomadas conservari possunt nec facile a petiolo decidunt ; caro potius siccus valde deliciosa.

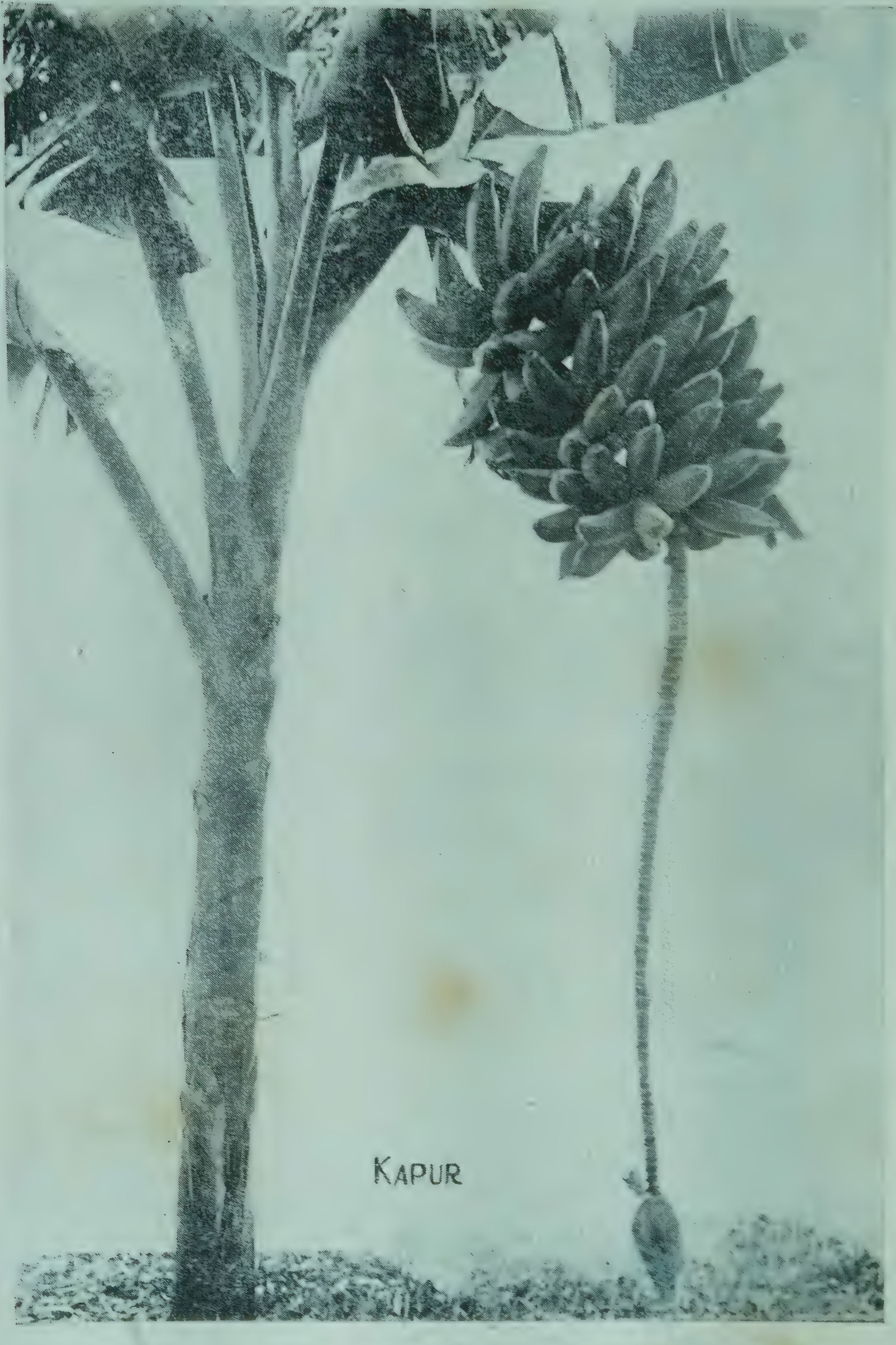
SIRUMALAI

Sirumalai—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *vannaniana* Jacob eco-type *sirumalaiensis* Jacob.

Local names.—Madras (Tamil) *Mala vazhai, Sirumalai, Udiran vazhai.*

It is a tall and stout plant similar to *Vannan.* It is an eco-type of *Vannan* but differs from it in the following characters :—The colour of ripe fruits yellow with a greenish tinge, when overripe turns dark ; fruits do not easily drop off from the pedicel but not so firmly attached as in *Virupakshi.* It has very good keeping quality but not so good as *Virupakshi.* The pulp is rather juicy and is as sweet and rich in flavour as *Virupakshi.* The rudimentary infertile seeds generally found in the pulp of bananas are absent in this. It is extensively cultivated in the Sirumalai Hills of the


SIRUMALAI



KAPUR

Madurai district between 2,000 and 2,500 feet. There is a large trade in the fruits of this variety in South India. There is a great demand for this fruit in the city of Madras. The 'hands' of *Sirumalai* are pulled off from the bunch with the 'wrist' and transported either loose or packed in cheap baskets. The hands of fruits of this variety can be made out by the fibrous tissue on the 'wrist.' In *Virupakshi* fruits the wrist portion is smooth and circular. *Virupakshi* fruits are often passed off as *Sirumalai*, but they can be easily distinguished by applying the above criterion. The cultivation practice is same as *Virupakshi.* It also deteriorates when grown in the plains and becomes identical with *Vannan.*

The description of stem, leaf, flower and fruit same as *Vannan.*

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *vannaniana* eco-type *sirumalaiensis* Jacob. Alter ecotypus of Vannan; altitudine 2,000—3,000 feet pedum crescens; fructus maturi per hebdomadam conservari possunt nec facile decidunt; caro leviter sucosus valdeque delisiosa.

KAPUR

Kapur.—*Musa sapidisiaca*, K. C. Jacob, nom. nov. var. *kapuriana* Jacob.

Local names.—Madras (Telugu) *Bangalore aratti*; (Kanarese) *Kapur bale, Janaka bale, Sal datti.*

It is a tall and stout plant with large leaves found in stray cultivation in the South Kanara district. It takes about 12½ months to mature from time of planting to harvest stage. It thrives well wherever it is grown. The bunches and fruits are very large. The ripe fruits are delicious. Its only drawback is the erect nature of the fruits on the bunch which hampers with easy transport. As with heavy yielding varieties, it requires large doses of manure to recuperate the soil. The quality of the fruit does not deteriorate appreciably by artificial treatment. This variety deserves to be widely grown.

Stem yellowish green with dark brown blotches especially on either side of the base of petiole, 13 feet high, circumference 29½ inches at base. Leaves linear oblong, smooth above, slightly glacuous below, leathery; petiole yellowish green, 16½ inches long, circumference 5½ inches, channel of petiole one inch wide, one inch deep, margin of petiole red to 1/12 inch broad; lamina 7¼ feet long, 27¼ inch broad; lamina base right side 1¼ inch short, slightly cordate, left side broadly obtuse; apex of lamina right side truncate, left side 50° : number of leaves 30 with an average monthly emergence of 4. Shot blades 2, bottom 39 inches long, lamina portion 27 inches long, 16 inches broad, top 24 inches long, lamina portion 3 inches long, 1¼ inches broad, distance between the two 39 inches long. Inflorescence, peduncle 20 inches long, glabrous, position of mature bunch 50° to the stem. It has female and deciduous male flowers only ; fertile axis 1½ feet long, deciduous male region 1¾ feet long. Bract outside deep purple, glaucous ; inside deep red, 23·6 centimetres long, 18 centimetres broad, ovate oblong ; apex broadly obtuse and splitting. Flower deciduous male, 6·3 centimetres long, one centimetre broad, 1·1 centimetre deep. Calyx (perigonium) 4·6 centimetres long, 2·1 centimetres broad ; margin hyaline, cream coloured, calyx outside and inside white with reddish lines ; lobes 5, inner two small alternating with three large, yellowish ; keels 2, rather prominent. Petals (scale) 2·2 centimetres long, 2·5 centimetres broad, rounded, bowl shaped, cream-coloured ; ridges 2, one large and one small ; apex very small, splitting, dark. Stamens 5, 3·3 centimetres long ; filament 2·2 centimetres long, whitish, flat, a slight bend at the junction of filament ; anther 1·5 inches long, poorly developed, thin, very dark, weak and bent back. Pistillode 6·2 centimetres long, style 3·7 centimetres long, whitish, rather stout ; tapers to stigma ; stigma yellowish, lobes 5, 3 prominent. Ovary deciduous, 2 centimetres long, whitish purple, 5-unequal sided 2 keels prominent, base of ovary whitish in colour ; pedicel ¾ inch long, 5-unequal sided, 5-ridged, all ridges prominent ; hands rather loose, 7 to 8, fingers rather loose, 12 to 13 in a hand, somewhat 5-sided, 2 sides rather convex, 5-ridged, all ridges prominent : 7 inches long, 5½ inches in circumference, 70 to 80 in a bunch ; fruit tapers to apex, apex ¾ inch long, 5-unequal sided, 5-ridged, all ridges prominent ; rind thick, fruit ripens yellow ; pulp cream-coloured, rather juicy, sweet with good flavour.

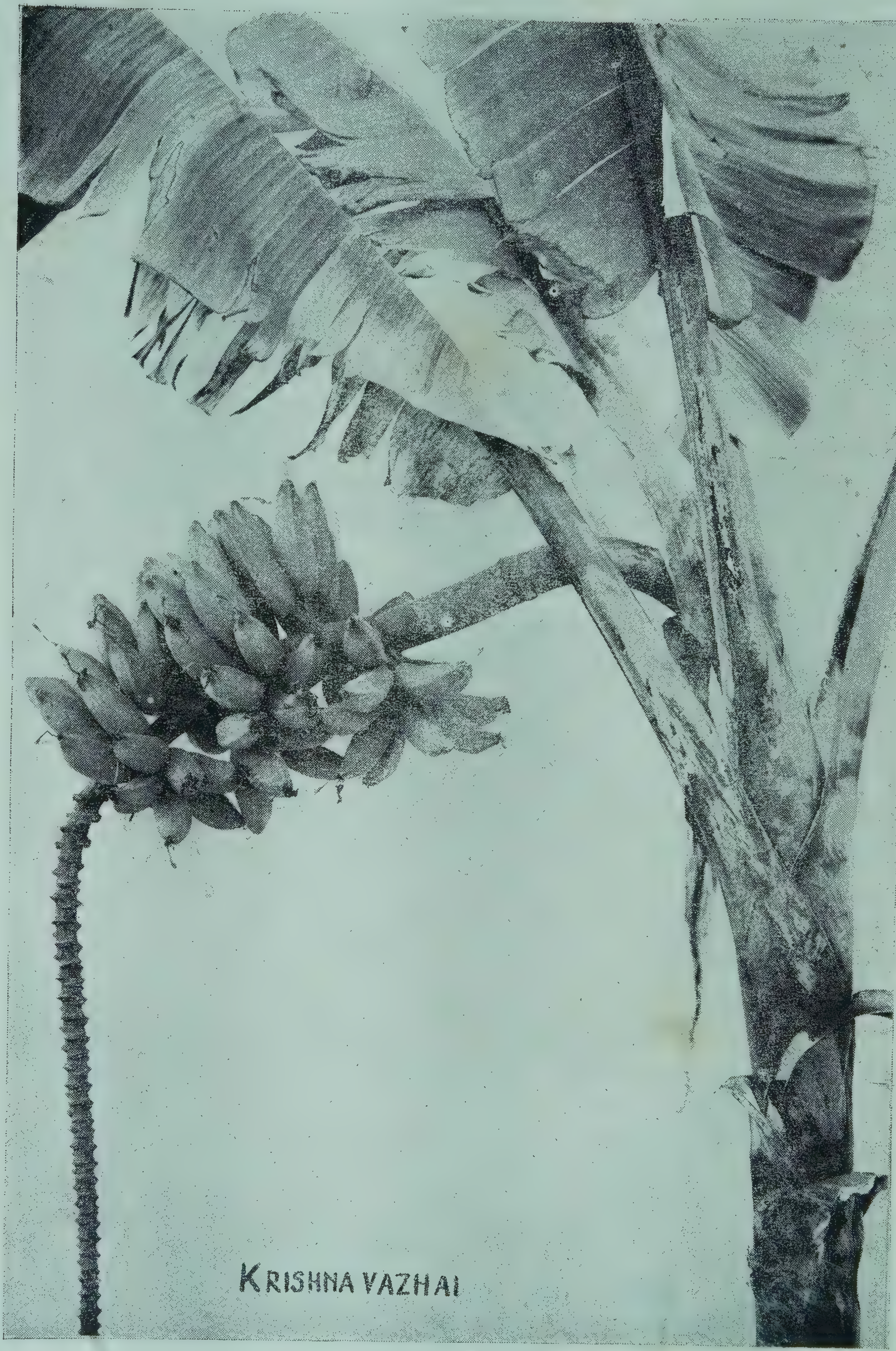
LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. ***kapuriana*** Jacob. Truncus altus, pinguis gravibus racemis. Latus dexterum laminae ad basim 1¼ inch sinistro brevius ; antherae fusco colore, fragiles et curvatae. Fructus magni, 7 inch. longi, sparsi ; apex longus caro suavis bono sapore.

APPLE

Apple.—Musa sapidisiaca K.C. Jacob nom. nov. var. ***kapuriana*** Jacob eco-type *appleiana* Jacob.

English name.—Apple.

It is a tall and stout plant with very large leaves. It is an eco-type of *Kapur* and was obtained from Honolulu, Hawaii. It is similar to *Kapur* in all respects except that some of the fruits in the basal hand do not develop fully especially during summer.



KRISHNA VAZHAI

The description of stem, leaf, flower and fruit, same as *Kapur.*

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *kapuriana* Jacob eco-type *appleiana* Jacob. Ecotypus of Kapur a qua differt in eo quod fructus ad basim racemi non plene ingravescunt praesertim aestivo.

KRISHNA VAZHAI

Krishna vazhai.—Musa sapidisiaca K.C. Jacob nom. nov. var. *krishnavazhaiana* Jacob.

Local names.—Madras (Tamil) *Kari vazhai* (Sirumalais, Madurai district).

It is a tall and stout plant found in stray cultivation in the Sirumalai and Pulney hills of the Madurai district. It is similar to *Virupakshi* and *Sirumalai* : when grown at an elevation of 4,000 to 5,000 feet, it has the taste and flavour of *Virupakshi* and when grown between 2,000 to 2,500 feet it has the taste and flavour of *Sirumalai* and when grown in the plains it has the taste and flavour of *vannan.* It takes about 14 months to mature from time of planting to harvest stage. The blue black colour of the stem gets speckled with dark grey spots when grown for two or three generations at Coimbatore which is in the plains. Plants grown in the shade have dark and larg spots even at Coimbatore.

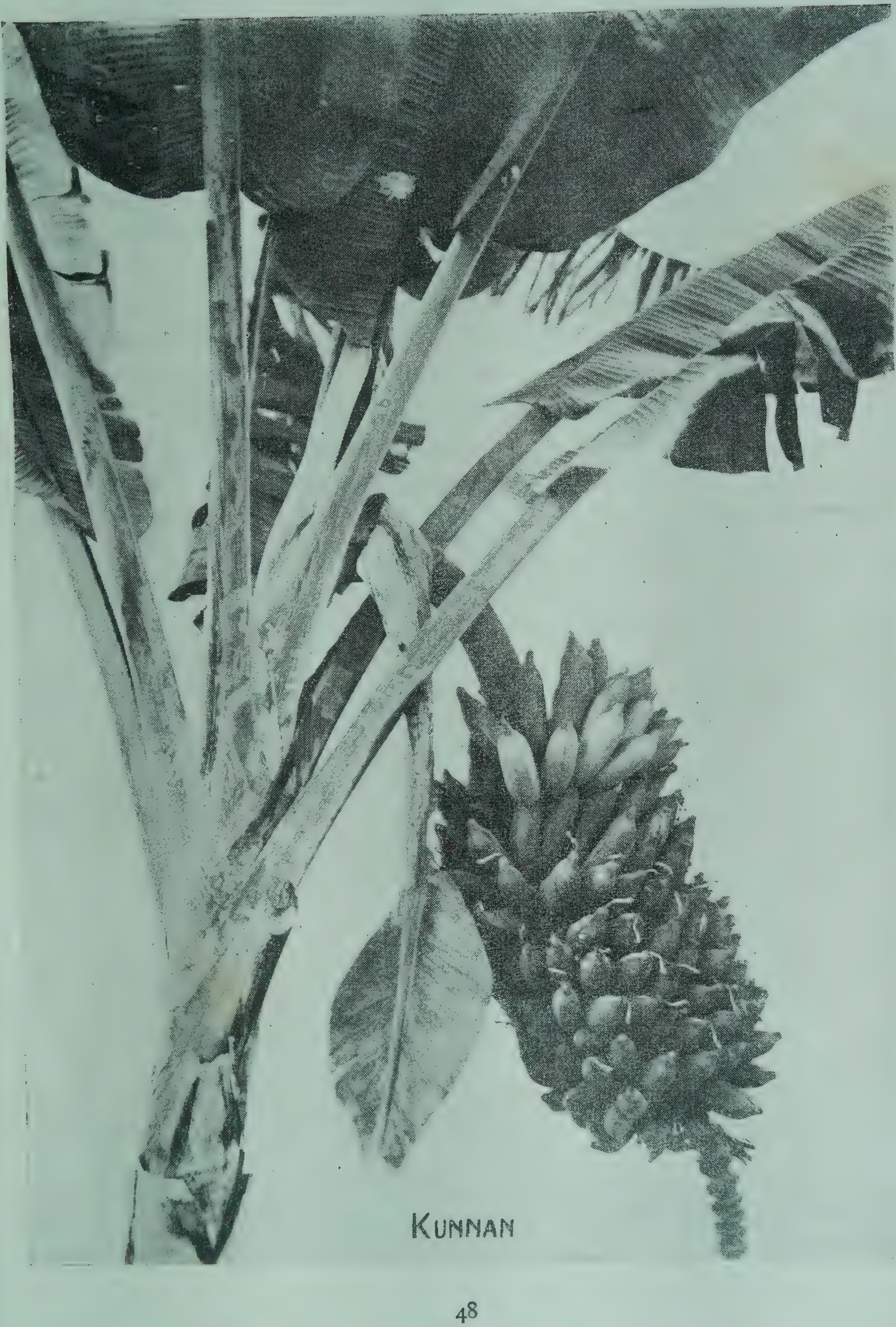
Stem blue black, but when grown in the plains greenish yellow with large and small purple blotches especially towards the base of petiole, 18½ feet high, circumference at base 42 inches. Leaves oblong, smooth above, very glaucous below, leathery ; petiole 19 inches long, 6½ inches in circumference ; channel of petiole one inch wide, one inch deep ; margin of petiole red to 1/12 inch broad ; lamina 7¼ feet long, 24½ inches broad ; lamina base right side 1/8 inch short, cordate, left side truncate and abruptly acute ; apex of lamina right side truncate, left side 55° ; number of leaves 41 with an average monthly emergence of 3. Shot blades 2, bottom 30 inches long, lamina portion 16 inches long, 11 inches broad ; top 21 inches long, lamina portion 2½ inches long, 1½ inches broad ; distance between the two 6 inches long. Inflorescence, peduncle glabrous, 22 inches long ; position of mature bunch 70° to the stem. It has female and deciduous male flowers only ; fertile axis 1¼ to 1½ feet long, deciduous male region nearly 2 feet long. Bract outside purple, light glaucous, inside dark red and slightly pitted in rows, towards the middle, 21·5 centimetres long, 15·5 centimetres broad apex obtuse, ovate oblong, split at tip, margins dark in colour, Flowers deciduous male, 6·7 centimetres long, 7 millimetres broad 1·1 to 1·2 centimetre deep. Calyx (perigonium) 4·5 centimetres long, 1·8 centimetres broad, outside cream-coloured with reddish tinge, inside dull violet and cream-coloured towards margin; lobes 5, 2 small alternating with three large, yellowish; keels 2, prominent. Petals (scale) 2·4 centimetres long, 2·4 centimetres broad, bowl shaped, 2 sides overlapping or touching, semi-transparent cream-coloured, ridges 2 or 3; apex acuminate, erect, yellowish. Stamens 5, 4·2 centimetres long, straight or with a slight bend at the junction of the anther; filament 2·2 to 2·3 centimetres long, white, slightly flat; anther 2·1 centimetres long, slightly bent outwards, cream-coloured; anther valves dark in colour. Pistillode 6·4 centimetres long; style 4 centimetres long, whitish with pinkish tinge, erect; stigma yellowish, lobes 5, prominent. Ovary deciduous, 1·9 to 2 centimetres long, greenish yellow with light violet blotches, 4 to 5-unequal sided, thick; pedicel 1 /3 inch long, 3 to 4-unequal sided, 3-ridged, all prominent; hands rather loose, 7 to 9; fingers rather loose, 11 to 13 in a hand, somewhat trete, 4 to 5-unequal sided, 2 sides convex, 4-ridged, all ridges prominent, $3\frac{3}{4}$ inches long, $4\frac{3}{4}$ inches in circumference, about 70 to 80 in a bunch; fruit tapers to apex, apex $\frac{1}{4}$ inch long, 4 to 5-sided, 4 to 5-ridged, 3 ridges prominent; rind thick ripening yellow, pulp cream-coloured, juicy, sweet and with good flavour. Fruits easily drop off from the pedicel.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *krishavazhaiana* Jacob. Var. *Vannan* et ecotypis *virupakthiensis* et *Sirumalaiensis* cognata ab qilla differt trunco coeruleo-nigro colore. Color hic in coloram fuscum vel canum mutatur, quando plantae per 2 vel 3 generationes in campo plano coluntur.

KUNNAN

Kunnan—*Musa sapidisiaca* K. C. Jacob var. *kunnaniana* Jacob.

Local names—Madras (Tamil) *Poong kadali*, *Vella kadali*, *Nar kadali*; (Telugu) *Amirthapani* (Siruvalanka, Kistna district) *Chakkera keli* (Vizagapatam), *Chinna sugantham*, *Ginni*, *Karpura chakkarakeli* (Chellapalli, Kistna), *Madras aratti*, *Neechu*, *Sanna aakulu chettu*, *Sugantha*; (Kanarese) *Chilli bale*, *Jirige bale*; (Malayalam) *Adukkan*, *Annaan*, *Kannan*, *Kunnan*, *Naadan kunnan*, *Valia kunnan*, *Adukvan*, *Adukku poovan*, *Kulamelkula*; Orissa—*Patti mokiri*, *Sudha*.



KUNNAN

It is a medium-sized plant found in stray cultivation especially on the Malabar coast with small, narrow and rather erect leaves. It takes about 15½ months to mature from time of planting to harvest stage. The *Poovan* variety produces much larger bunches than this under similar treatment ; hence it is not grown as pure stand anywhere. The unripe fruits are used for culinary purpose for the sick and invalid on the Malabar coast.

Stem yellowish green with dark blotches, 12 to 13 feet high, circumference at base 26 to 30 inches. Leaves rather erect, leathery, glaucous below ; petiole 25 to 28 inches long, circumference 4½ inches ; margin of petiole red tinged to 1/12 inches broad ; channel of petiole ½ to ¾ inch deep, ¼ to ½ inch wide ; lamina linear oblong, 8¼ to 9 feet long, 24 to 28½ inches broad ; lamina base right side ¾ inch short, deeply cordate, left side slightly auricled, auricles 1¼ inches deep ; apex of lamina right side truncate, left side ¾ of a right angle ; number of leaves 40 with an average monthly emergence of 4. Shot blades 2, bottom 3 feet long, lamina portion 19 inches long, 11 inches broad ; top 21 inches long, the lamina portion 2 inches long, ¾ inch broad ; distance between the 2 shot blades 7 inches. Inflorescence, peduncle glabrous, 9 to 10 inches long, position of mature bunch ¾ right angle to the stem ; it has female and deciduous male flowers only, fertile axis 18 to 21 inches long, deciduous male portion of axis 1½ to 2 feet long. Bract outside purple, glaucous, inside red, dark red towards the margins, 19 centimetres long, 10 centimetres broad ; apex rounded. Flower deciduous male, 6 centimetres long, 4 centimetres broad, 5 centimetres deep. Calyx (Perigonium) 4 centimetres long, 1·2 centimetre broad, outside pinkish yellow, inside pinkish yellow with margins hyaline ; lobes 5, 3 very prominent and 2 small, yellow ; keels 2 in the upper row and none in the lower row. Petals (scale) 2·4 centimetres long, 1·6 centimetres broad, the two sides not touching ; ridges, 2 to 4, rather prominent ; apex long, acuminate, erect, yellowish. Stamens 5, 3 fully developed and 2 rudimentary with only filaments, 3·8 centimetres long ; filament 1·9 centimetres long, white, flat, straight ; anther 1·8 centimetres long, erect, whitish ; anther valves greyish brown ; pollen is not present. Pistillode 5·9 centimetres long ; style 3·9 centimetres long, white, stigma yellowish ; lobes 5, rather stout. Ovary deciduous, 2 centimetres long, white with pinkish hue, oblong, tapering to base, terete. Pedicel ¾ inch long, 5-unequal sided, 5-ridged, 3 ridges prominent ; hands 6 to 10, rather compact, fruits 12 to 15 in a hand, 5¼ inches long, circumference 4¾ inches, terete, 5-ridged, 3 ridges prominent ; fruit tapers to apex, apex ½ inch long, 5-unequal sided, 5-ridged, 3 ridges prominent ; 80 to 100 in a bunch ; fruits strongly held to the pedicel ; rind when ripe yellow, medium thick ; pulp firm and sweet.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. ***kunnaniana*** Jacob. Plantae parvae ; folia parva angusta, potius erecta ; petioli canalis non late aperta ; latus dexterum basis cordata latus sinistrum auriculatum ; adsunl flores feminei et decidui flores masculini tantum apex distinctus ; fructus fortiter petiolis affixi ; caro firina et suavis.

AYIRAM KUNNAN

Ayiram kunnan.—Musa sapidisiaca, K. C. Jacob, nom. nov. var. *kunnaniana* Jacob type *ayiramkunnaniana* Jacob.

It is an unstable type of *Kunnan* found in stray cultivation on the Malabar coast. One or two plants in a stool of about six plants may sometimes have bunches with two to three hundreds of small slender fruits which range themselves in a congested manner on the axis, while the other plants produce normal *Kunnan* bunches. The suckers of the congested type produce normal *Kunnan* bunches. This type is noticed in plants grown successively for three or four generations in the same stool.

The stem, leaf and flower, same as *Kunnan.*

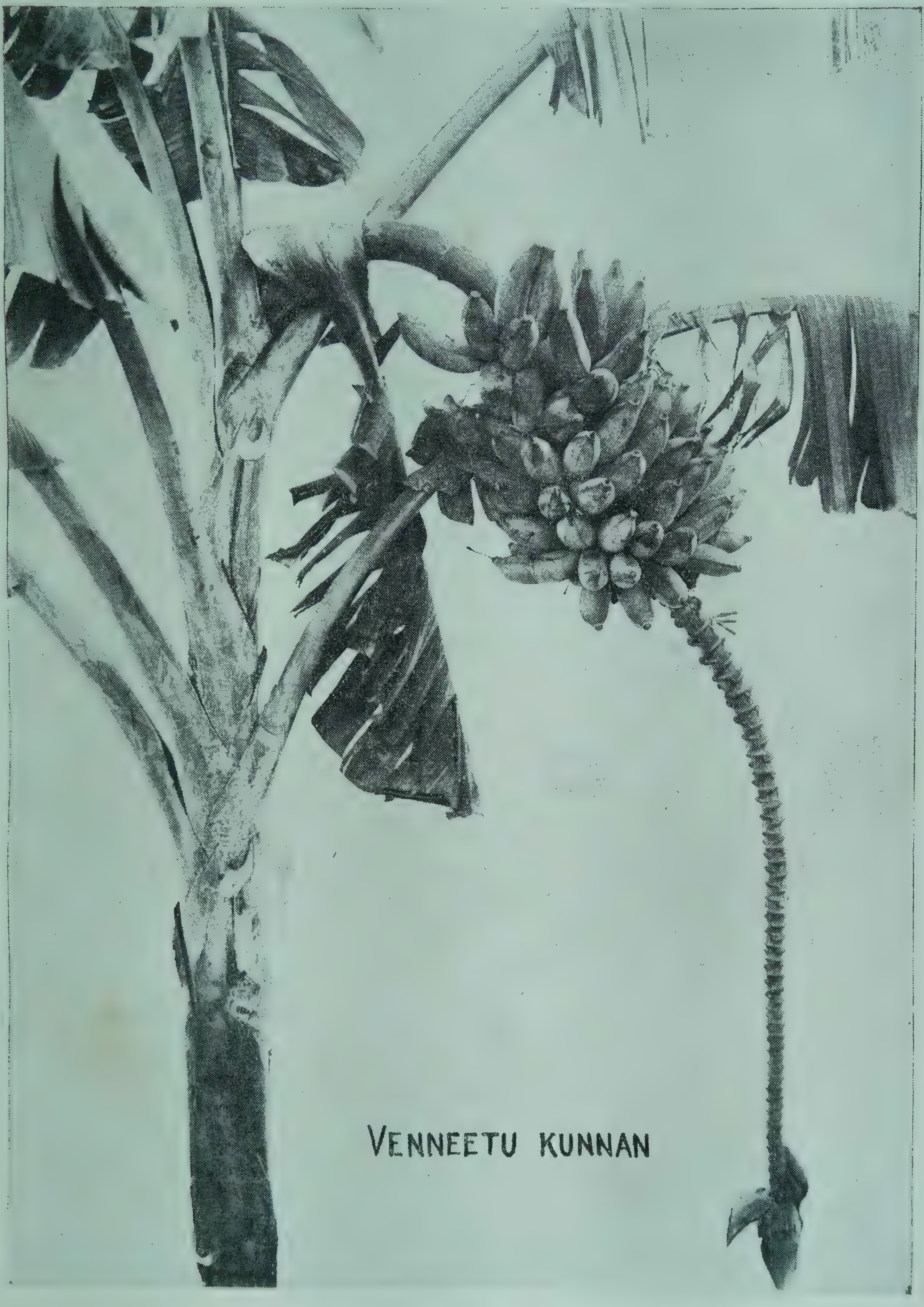
VENNEETU KUNNAN

Venneetu kunnan.—Musa sapidisiaca nom. nov. K. C. Jacob var. *venneetukunnaniana* Jacob.

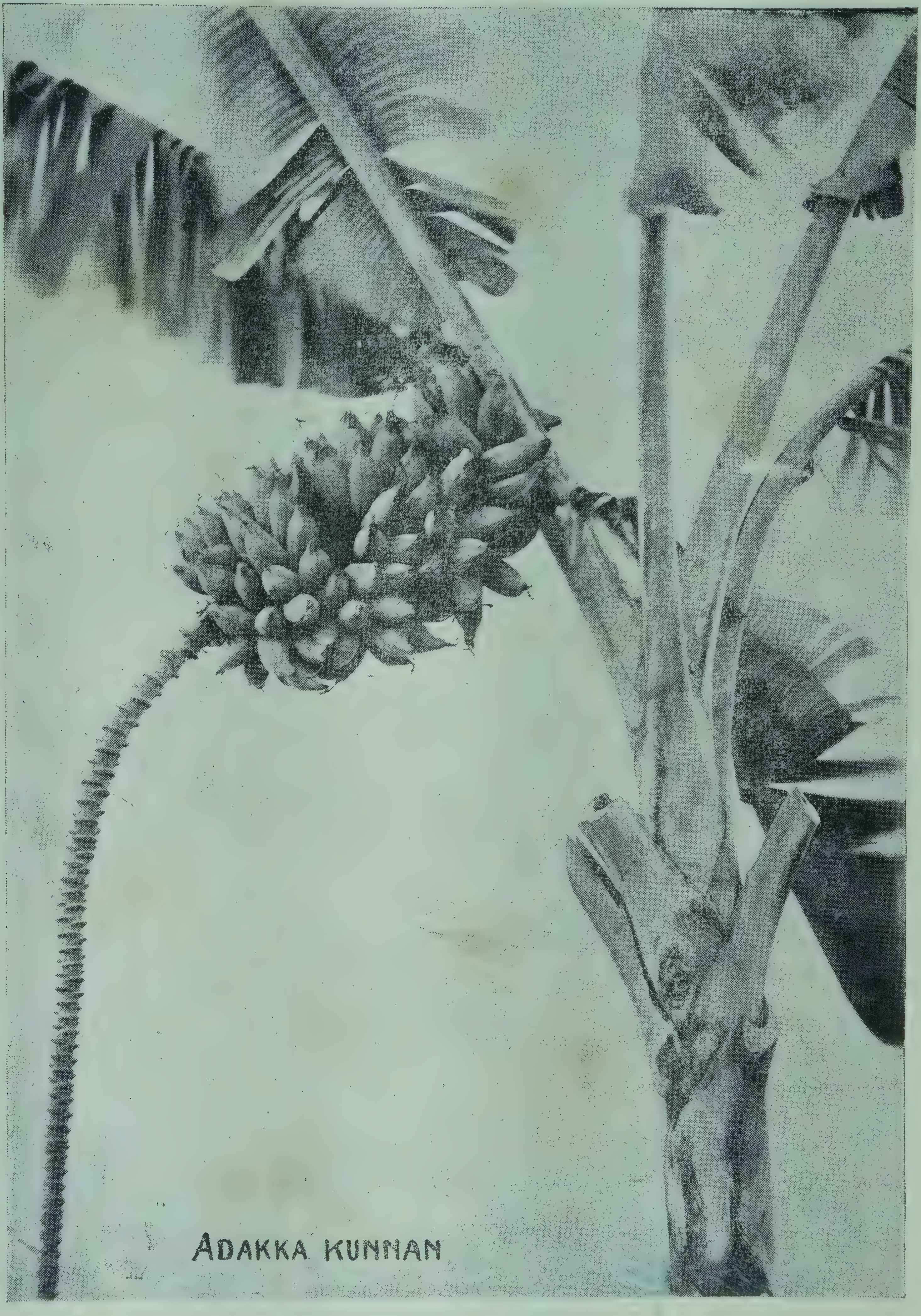
Local names.—Madras (Tamil) *Samba poongkadali* ; (Malayalam) *Venneetu kunnan.*

It is a rare variety of medium height found in stray cultivation mainly on the Malabar coast. The leaves are small, narrow and rather erect as *Kunnan.* It takes about 15 months to mature from the time of planting to harvest stage. It is similar to *Kunnan* except that fruits of this variety are ashy coated and the pulp of the ripe fruit is not so firm as in *Kunnan.* The ashy coating on some of the bananas described here is a waxy coating—a thin epidermal layer of rods or grains forming a glaucous bloom on fruits, leaves or stems. Generally among the varieties that are used for culinary purpose, the ashy coated ones are considered superior to other varieties. For this reason this variety may be tried for its superiority.

Stem light green with dark brown blotches below the petiole, 7½ feet high, circumference at base 24 inches. Leaves rather erect, narrowly oblong, glaucous below ; petiole yellowish green, glaucous, 2 feet long, 4½ inches in circumference ; channel of petiole 6/10 inch wide, 7/10 inch deep ; margin of petiole pinkish to 1/8 inch broad ; lamina 7 feet long, 25½ inches broad, lamina base right side equal



VENNEETU KUNNAN



ADAKKA KUNNAN

to left, right side deeply cordate, left side auricled ; auricle 1½ inches deep ; apex of lamina right side truncate, left side 80° ; number of leaves 34 with an average monthly emergence of 3. Shot blades 3, bottom erect or drooping, 5½ feet long, lamina portion 51 inches long, 22½ inches broad ; second, 33 inches long, lamina portion 17½ inches long, 11¼ inches broad ; third (dried) 23 inches long, lamina portion 3 inches long, 1½ inches broad ; shot blades attached to the central axis inside stem. Inflorescence, peduncle glabrous, one foot long, position of mature bunch 50° to the stem. It has female, 4 to 5 hands of persistent male in some and deciduous male flowers ; fertile axis 1¼ foot long, deciduous portion 2 feet long. Bract outside deep red, glaucous ; inside brick red, pitted longitudinally in lines, 23·4 centimetres long, 15·4 centimetres broad ; apex broadly obtuse. Flower deciduous male, 7·2 centimetres long, 1·1 centimetre broad ; 5 centimetres deep. Calyx (perigonium) 4·1 centimetres long, 1·2 centimetre broad ; calyx outside white with light violet tinge ; inside bright violet tinge ; lobes 5, 3 large alternating with 2 small, end ones awl shaped, yellowish ; keels 2, prominent. Petals (scale) 2·3 centimetres long, 1·9 centimetres broad, boat shaped, pale white ; apex acuminate, bent inside, ridges one to two. Stamens 5, 2 large, 1·5 centimetres long, 3 small, 9 centimetres long ; filament 1·4 centimetre long, white, cylindric, anther one centimetre long, dried, slightly brownish. Pistillode 7·1 centimetres long, style 4·2 centimetres long, white ; stigma yellowish, lobes 5, indistinct. Ovary deciduous, 2·9 centimetres long, ivory white, 2-ribbed on the back and terete in front, tapers towards base. Stamens are very small and are only ½ the length of the scale. Pedicel ½ inch long, 5-unequal sided, 5-ridged, 3 ridges prominent, hands compact, 7 to 9 ; fingers compact, 12 to 14 in a hand, terete with 5 ridges, 2 ridges prominent ; 4½ inches long, 4½ inches in circumference, about 100 in a bunch ; apex distinct, ¼ inch long, terete, 5-ridged, 2 prominent ; ripe fruit strongly held to pedicel ; rind medium thick, ripening to dull yellow ; pulp light cream-coloured, rather juicy, firm and sweet.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *venneetukunnaniana* Jacob.

Similis to *Kunnan* a qua planta differt fructbus cincreo colore coloratis carn equ fructuum maturorum non ita firma ut in *Kunnan* Laminæ bases æquales.

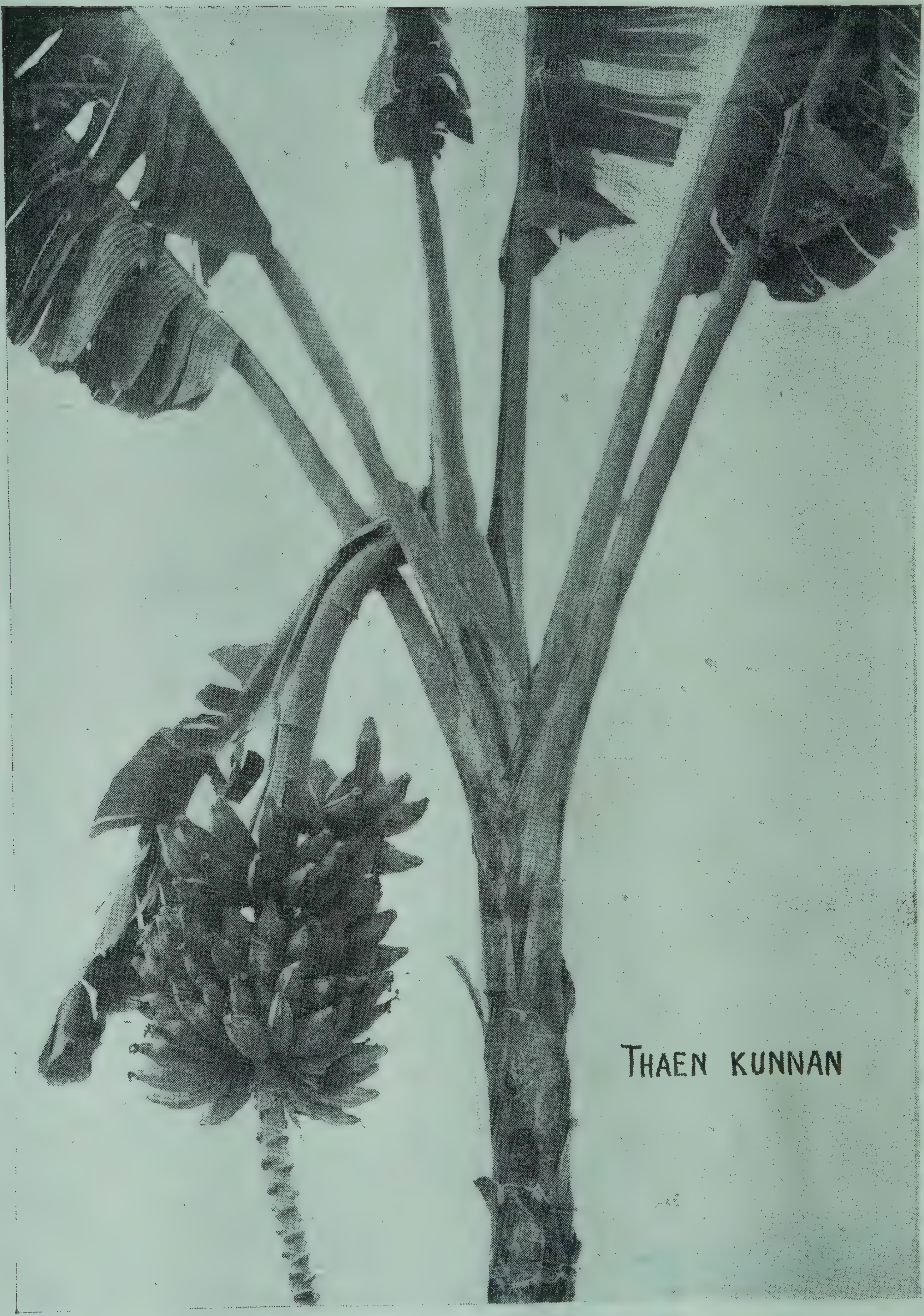
ADAKKA KUNNAN

Musa sapadisiaca K. C. Jacob nom. nov. var. *adakka kunnaniana* Jacob.

Local names.—Madras (Malayalam), *Adakka kunnan, Chara kunnan, Cheru kunnan, De kunnan, Mundi kunnan, Mutti kunnan, Pakada kunnan, Samba kunnan, Venneer kunnan.*

It is a medium-sized plant found in stray cultivation on the Malabar coast. The leaves are larger and broader than *Kunnan* but not so erect. The bunches are fairly large with the smallest of all banana fruits. It takes about 17 months to mature from time of planting to harvest stage. The flour prepared of the unripe fruits is largely used as food for infants throughout the West Coast of the Madras province. The protein content of this flour is 5 per cent while that of the other varieties is only about 3 per cent. The taste and flavour of the ripe fruits are not appreciated. It is not, therefore, recommended for growth of fruits to be consumed when ripe or used as curry stuff in its unripe stage. It is recommended for making flour only.

Stem yellowish green with dark blotches, 11 feet high, circumference at base 26 to 30 inches. Leaves rather erect, smooth, glaucous below, leathery ; petiole 20 to 23 inches long, circumference 3¾ inches, margins of petiole red-tinged to 1/16 inch broad ; channel of petiole ½ inch deep, margins touching or 1/8 inch broad ; lamina base right side 5/8 inch short, deeply cordate, left side cordate ; apex of lamina right side truncate, left side ¾ right angle ; number of leaves 40 with an average monthly emergence of 4. Shot blades 2, bottom 38 inches long, lamina portion 24 inches long, 14½ inches broad ; top 16 inches long, lamina portion 1½ inches long, 1-1/8 inch broad, distance between the two shot blades 11 inches long. Inflorescence, peduncle slightly pubescent, 9 inches long ; position of mature bunch slightly less than a right angle ; it has female and deciduous male flowers only ; fertile axis one to 1¼ foot long, deciduous male portion of axis 1½ to 2 feet long. Bract outside light red, glaucous ; inside light red, pitted in the basal half, 17·1 centimetres long, 13·5 centimetres broad ; apex rounded, narrow. Flower, deciduous male 7·1 centimetres long, ·5 centimetre broad, ·6 centimetre deep. Calyx (perigonium) occasionally 2 when the small one is opposite to large one, the latter has one small lobe alternating with two large ones, 4·6 centimetres long, 1·5 centimetres broad ; calyx outside cream-coloured with red tinge, inside cream-coloured and reddish towards centre ; lobes 5, generally 2 small alternating with 3 large, yellowish ; keels 2, not prominent. Petals (scale) 2·4 centimetres long, 1·8 centimetres, broad, 2 sides erect, cream-coloured and partially hyaline ; ridges 5, conspicuous ; apex not pointed, erect, ridge often one. Stamens 5, 5·1 centimetres long, bent at the junction ; filament 3·7 centimetres long, cream-coloured, nearly


THAEN KUNNAN

flat; anther 2 centimetres long, tapers to the tips; tip bent, dark; anther valves dark grey. Pistillode 6·6 centimetres long; style and stigma 4·5 centimetres long; style whitish; stigma yellowish, lobes 3, small. Ovary deciduous, 2·3 centimetres long, greenish yellow, flat outside, terete inside, gradually tapering to base. Wrist up to ½ inch broad towards the base; pedicel ½ to 5/8 inch long, 5-unequal sided, 5-ridged, 3 ridges prominent; hands 8 to 10, rather compact; fruits up to 15 in a hand, 3½ inches long, circumference 4½ inches, terete, 5-ridged, one ridge prominent; fruit with a whitish bloom, tapers to apex; apex ¼ to 1/3 inch long, 3-sided and then terete; ridges 3, prominent; 80 to 100 in a bunch; fruits strongly held to the pedicel, rind when ripe dull yellow, medium thick; pulp firm and sweet.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *adakkakunnaniana* Jacob.

Folia largiora et latiora quam in *Kunnan.* Fructus hujus varietat omnium varietatum minimi; fructus leviter cinereo colore colorati; caro firma et suavis; protein substantiæ farinæ 5 percent dum in ournibus ceteris varietatibus 3 per cent non excedunt.

THAEN KUNNAN

Musa sapidisiaca K. C. Jacob, nom. nov. var. *thaenkunnaniana* Jacob.

Local names.—Madras (Tamil) *Poovilla vazhai, Poong kadali*; (Malayalam) *Thaen kunnan, Kunnan* (Ponnani, Malabar).

It is a medium-sized plant mostly confined to the West Coast of the Madras province. The bunches of fruits are of medium size and the fruits have pronounced apex. It takes about 16 months to mature from time of planting to harvest stage. It is a very rare variety found in stray cultivation. The pulp of the ripe fruit is very sweet and pure white in colour.

Stem yellowish green, 11 to 13 feet high, circumference at base 2 feet. Leaves rather erect, linear oblong; petiole yellowish green, 22 to 27 inches long, circumference in the middle 4½ inches; channel of petiole ½ inch broad, ½ inch deep, margins of petiole red, 1/5 inch broad, lamina base unequal, right side ½ inch short, slightly cordate, left side cordate; lamina 6—8 feet long, 20—23 inches broad; apex of lamina right side truncate, left side 85°. Shot blades 2, bottom 38 inches long, the lamina portion 24 inches long, 12½ inches broad; top 24 inches long with the lamina portion 5 inches long, 1¼ inches broad; distance between the 2 shot blades 8¼ inches. Inflorescence, peduncle glabrous, 10 to 12 inches long, position of mature bunch 50° ; fertile axis 1½ to 2 feet long, deciduous male portion 2 to 2½ feet long. It has female and deciduous male flowers only. Bract outside deep purple, corrugated and glaucous, inside deep red and polished, ovate oblong ; apex rounded, 28 centimetres long, 14·8 centimetres broad at the broadest part. Flower deciduous male, 7·3 centimetres long, 4 millimetres wide and 8 millimetres deep. Calyx (perigonium) 5 centimetres long, 1·7 centimetres broad, keels 2, one more prominent than the other, margins scarious, reddish white outside, red inside, margins scarious and cream-coloured, lobes very large, 2 small alternating with 3 large, yellow. Petals (scale) 2·5 centimetres long, 2·3 centimetres broad, bowl-shaped, scarious with reddish hue ; apex acuminate and yellowish ; ridges 3. Stamens 5, ivory coloured, 4 centimetres long ; filament 1·7 centimetres long ; anther 2·3 centimetres long, valves greyish. Pistillode including stigma overtopping stamens, 4·5 centimetres long, style white, stigma yellowish with 5 distinct lobes. Ovary 4 to 5-unequal sided, ivory coloured, 2·4 centimetres long. Wrist prominent in the bottom hands up to one inch broad ; pedicel ¾ inch long, unequally 5-sided, 5-ridged, 2 ridges prominent. Hands 7 to 8, rather loose ; fruits rather erect, 13 to 14 in a hand, 4½ to 5 inches long, 4¾ inches in circumference, 5 unequal sided, 2 broad sides slightly convex, 5-ridged, all prominent; apex stout, ½ inch long, 5 unequal sided and 5-ridged, all ridges prominent, fruit tapers to apex ; 80 to 120 in a bunch ; fruit easily drops off from the pedicel ; rind when ripe yellow, medium thick ; pulp white, very sweet. A dessert banana. It is not used for culinary purposes.

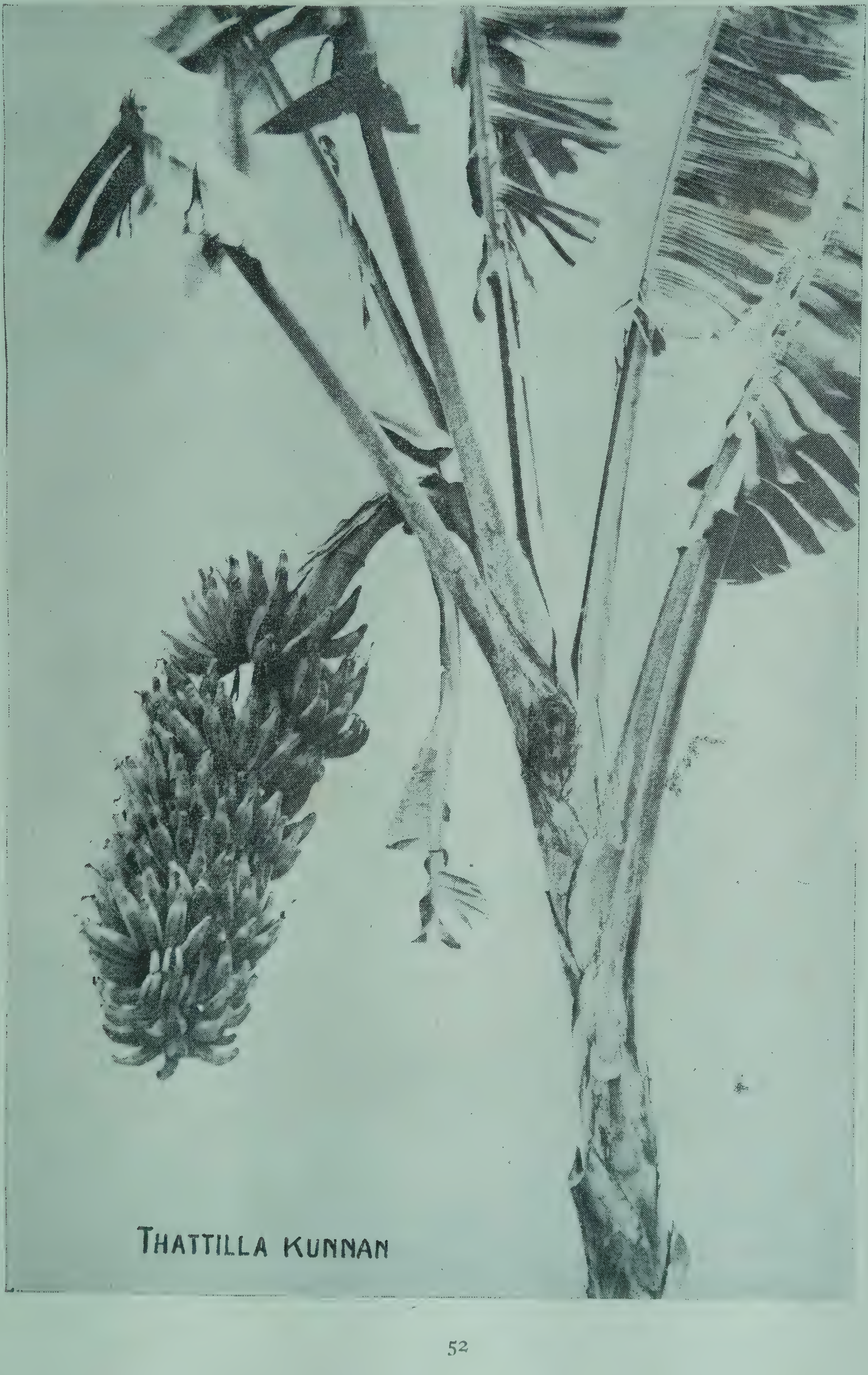
LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *thaenkunnaniana* Jacob.

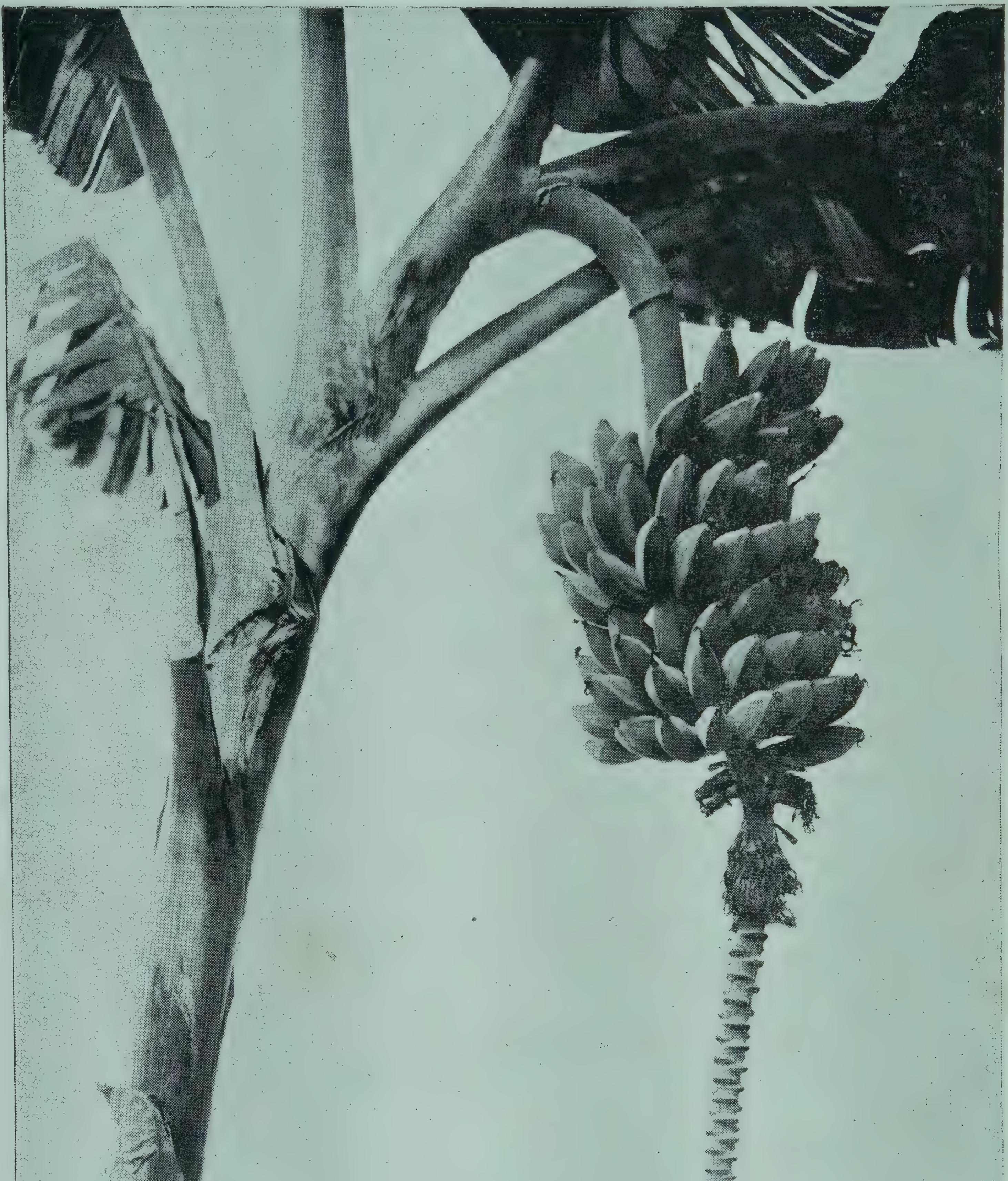
Foliis linearibus, oblongis, potius erectis, rubris petioli marginibus; floribus femineis et deciduis staminatis tantum ; parte prima palmæ " wrist " prominenti in imis manibus "hands " us que ad 1 inch lata ; fructibus fere erectis, inæqualiter 5-lateralibus, apice solido, ½ inch longo ; fructibus maturis facile cadentibus ;carne alba et suavissima.

THATTILLA KUNNAN

Musa sapidisiaca K. C. Jacob, nom. nov. var. *thaenkunnaniana* forma *thattillakunnaniana* Jacob.

Local names.—Madras (Tamil) *Poola chundan*, *Poo vazhai*, *Poovilla vazhai* ; (Telugu) *Benda aratti*, *Chitrachalam*, *Godavari keli* ; (Kanarese) *Kaththe bale*, *Mambilla*, *Rundu bale* ; (Malayalam) *Chundilla kunnan*, *Chundillan*, *Kodapilla kunnan*, *Koombilla*


THATTILLA KUNNAN



PEYAN

annaan, *Koombilla chingan*, *Koombilla kannan*, *Koombilla poovan*, *Mambilla kunnan*, *Maniyilla kunnan*, *Thattilla kunnan* ; Ceylon—*Suwandel.*

It is a medium-sized plant found in stray cultivation throughout the Madras province. The bunches are heavy with long, five sided fruits having an elongated apex. It takes about 18 months to mature from time of planting to harvest stage. The ripe fruits are very sweet in taste and the colour of the pulp is pure white. The ripe fruits easily drop off from the pedicels and this character is a handicap to easy transportation of fruits. It is found in stray cultivation throughout the Malabar coast. It is grown to some extent on the Western slopes of the Peermade hills of Travancore as a rain-fed crop and also as an irrigated crop of pure stand in the sandy soils of Thisianvilai, a village in the Tirunelveli district. The large size of the bunches and fruits and the sweetness of the pulp of this variety make it very suitable for growth on an extensive scale. It is a sport of *Thaen kunnan* but differs from it in the following characters :—There are only pistillate flowers in this and all of them develop into fruits. Fruits and apex of fruits are longer than those of *Thaen kunnan.* Number of hands and fruits are more than those of the mother plant.

Description of plant, leaf and fruit same as *Thaen kunnan.*

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *thaen kunnaniana* Jacob, Forma *thattillakunnaneana* Jacob. Sport of *Thaenkunnan* : a qua planta differt inflorescentia femineorum florum tantum, ex quibus omnibus fructus evolountur, magnis fructuum manipulis, apicibus fructuum 1 ad 2 inch. longis, albissima dulcissimaque carne.

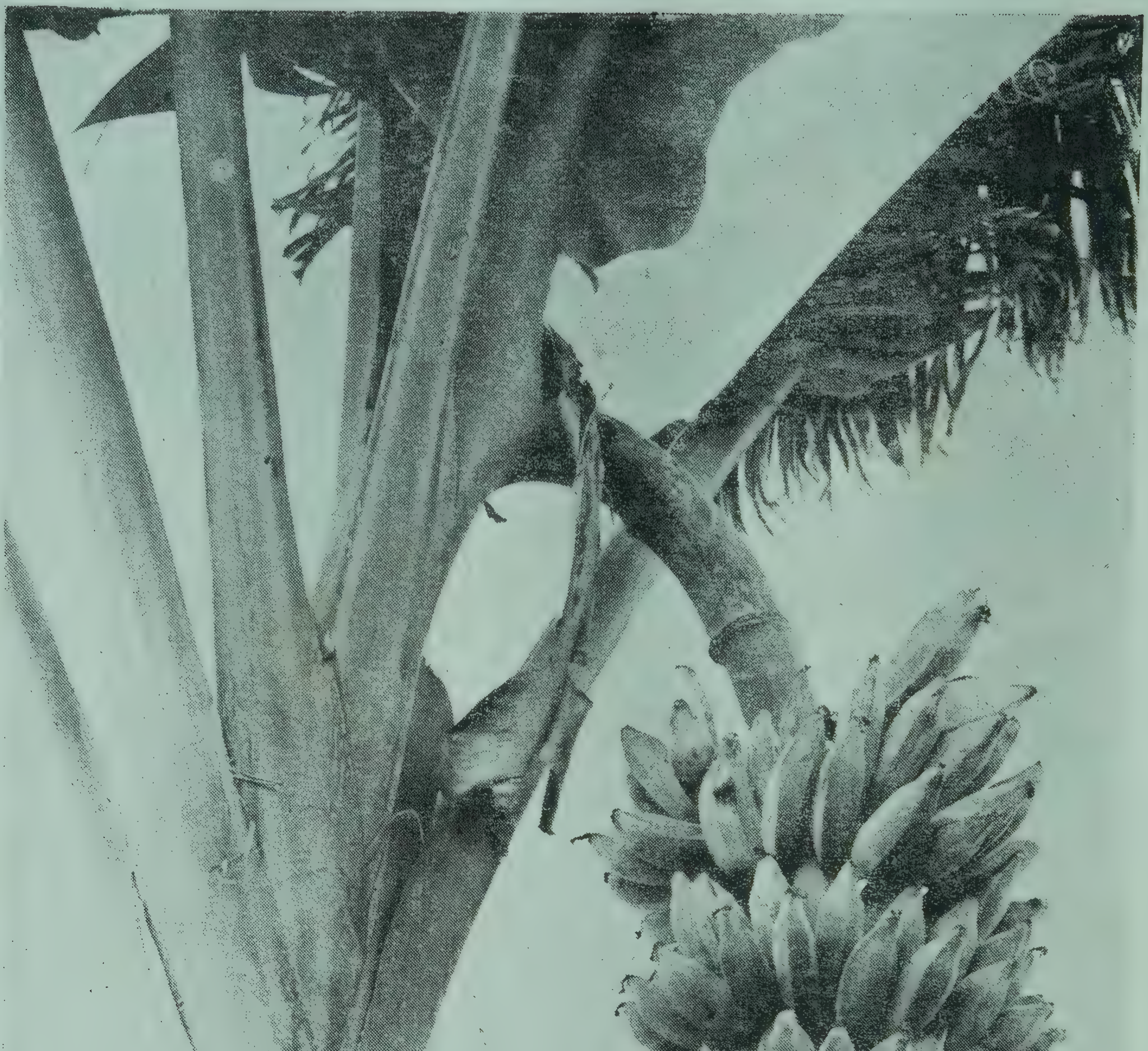
PEYAN

Musa sapidisiaca K. C. Jacob, nom. nov. ver. *peyaniana* Jacob.

Local names.—Madras (Tamil) *Kotta vazhai*, *peyan*, *Savargundy* ; (Telugu) *Booditha aratti*, *Nokala bontha*, *Palakola bontha*, *Sapota bontha*, *Rasthali* (Siruvalanka, Kistna) ; (Malayalam) *Ney vannan*, *Ney vazha.*

It is a very tall and stout plant found in stray cultivation especially in the backyards of houses on the East Coast Tamil districts of the Madras province. The leaves are very large and the bunches are of medium size with 5-unequal sided fruits. It takes about 15 months to mature from time of planting to harvest stage. One single stool of this variety, which the author noticed in the backyard of a house at Mayavaram in the Tanjore district, had spread in the course of about 12 years to about 100 square feet with nearly 35 plants. There is no other banana variety, the fruits of which, are so closely set in the 'hand' as this. This fruit is in great demand in the Madras city. It is reputed to have laxative properties.

Stem greenish with few dark blotches towards the base of petiole; 11¾ feet high, circumference at base 31 inches. Leaves oblong, polished above, glaucous below, thick, leathery; petiole greenish yellow, slightly glaucous, 25 to 29 inches long, 6 inches in circumference; channel of petiole ⅓ to ¼ inch wide, ¾ inch deep; margin of petiole a thin dark line; lamina 7¾ feet long, 25½ inches broad; lamina base right side ¾ inch short, slightly cordate, left side slightly cordate and abruptly acute; apex of lamina right side truncate, left side ¾ right angle; number of leaves 34 with an average monthly emergence of 3 to 4. Shot blades 2, bottom erect or drooping, 42 inches long (seen outside), lamina 33 inches long, 17¼ inches broad; top (dried) 18½ inches long, lamina portion 2½ inches long, 1⅛ inch broad. Inflorescence, peduncle glabrous, 20 inches long, circumference 6 inches; position of mature bunch 30° to the stem. It has female, 3 to 4 hands of persistent male and the rest deciduous male flowers; fertile axis one to 1¼ foot long, deciduous male region 3 feet long. Bract outside light purple, slightly glaucous; inside long pits in rows for little more than ½ towards base; 22·2 centimetres long, 15·5 centimetres broad; apex round, ovate oblong. Flowers 2 to 4 hands of persistent male and the rest deciduous male; latter 6·8 centimetres long, 1·2 centimetre broad, 1·1 centimetre deep. Calyx (perigonium) 5 centimetres long, 1·5 centimetres broad; calyx outside purplish grey; inside purplish, margin hyaline, lobes 5, 2 small alternating with 3 large, yellow; keels 2, not prominent. Petals (scale) 2·4 centimetres long, 2·5 centimetres broad; bowl-shaped, semi-transparent, purplish; apex short, bent inside, acute, yellowish, shorter than the two protruding portions of the petal on either side; ridges 2, one large and the other small, not prominent. Stamens 5, 4·8 centimetres long, equal, longer than stigma, all bent back similarly; filament 2·8 centimetres long pinkish white, flat, straight; anther 2·2 centimetres long, whitish; anther valves dark grey. Pistillode 6·6 centimetres long, style 4·6 centimetres long, whitish, stigma brown, lobes 5, indistinct; 2 to 4 hands persistent, rest deciduous. Ovary 2 centimetres long, whitish, 4 to 5 unequal sided, medium in size. Wrist ½ inch broad towards base, pedicel 1¼ inch, 5 unequal sided, 5-ridged, 4 ridges prominent; hands rather compact, 6 to 8; fingers very compact, up to 20 in a hand, 5 unequal sided, 2 sides slightly convex, 4½ inches long,



PEY LADAN

5½ inches in circumference, about 80 to 100 in a bunch ; fruit tapers to apex, apex ½ inch stout, 5 unequal sided, 5 ridged, all ridges prominent ; rind very thick, ripening yellow, pulp juicy, sticky, very soft and sweet ; fruits held strongly to the pedicel.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *peyaniana* Jacob.

Plantae altissimae et robustae, foliis amplis latere dextero folii ad basim sinistro ¾ inch, folii basi cordata ; fructibus manipulorum valde compressis, inaequaliter 5-lateralibus ; fructibus maturis firmiter pedicellis affixis carne adhaerenti, mollissima et dulci.

PEY LADAN

Musa sapidisiaca K. C. Jacob, var. *peyladaniana* Jacob

Local names.—Madras (Tamil) *Ladan*, *Mada vazhai*, *Maharan vazhai*, *Peyan* (Erode, Coimbatore district), *Pey ladan*, *Pey monthan*, *Pey vazhai*, *Pidi monthan.*

It is the tallest and the stoutest variety amongst the Madras bananas with large leaves. It is found in stray cultivation in the southern districts of the Madras province. The bunches are heavy with medium-sized fruits. It takes about 17½ months to mature from time of planting to harvest stage. This is not grown as pure stand anywhere. The ripe fruit is not a good eating banana. The unripe fruits are some times used as curry stuff.

Stem greenish with light purple tinge in varying intensity, 12½ feet high, circumference at base 31 inches. Leaves oblong, glaucous below ; petiole very stout, greenish yellow, 2 feet long, circumference in the middle 6 inches ; channel of petiole 1/3 inch wide, one inch deep, margin deep red to 1/6 inch broad ; lamina 8 to 9½ feet long, 27 inches broad ; lamina base right side ¼ inch short, cordate, left side narrowly auricled, auricle 2 inches deep ; apex of lamina right side truncate, left side 60° ; midrib very stout, number of leaves 44 with an average monthly emergence of 3. Shot blade, bottom erect, 30 inches long (seen outside), lamina portion 22 inches long, 14½ inches broad ; top (dried) 18½ inches long, lamina portion 2½ inches long, one inch broad. Inflorescence, peduncle glabrous, very stout, 18 inches long, circumference 6½ inches ; position of mature bunch 50° to the stem. It has female and deciduous male flowers only ; fertile axis 1½ feet long, sterile axis 2 feet long. Bract outside deep purple, glaucous, inside deep red, pitted towards middle, 20·8 centimetres long, 16·7 centimetres broad ; apex rounded. Flower deciduous male, 7·2 centimetres long, ·8 to 1·2 centimetre broad, 1·2 centimetre deep; calyx 4·8 centimetres long, 1·5 centimetres broad; outside yellowish purple, inside light purple, cream-coloured on the margins; lobes 5, 2 small alternating with 3 large, yellowish; keels 2, not prominent. Petals 3·2 centimetres long, 2·8 centimetres broad, boat-shaped, sides not touching, semi-transparent, white with pinkish tinge; ridges 2, one very prominent; apex broadly acute, erect, without ridge; petals bent to a keel towards the top half. Stamens 5, 4·8 centimetres long, slightly overtopping stigma, filaments 2 to 3 centimetres long, whitish, slightly flat; straight; anther 2·3 centimetres long with a slight bent to outside, white; anther valve brownish grey; pollen present. Pistillode 7 centimetres long; style 4 centimetres long, whitish; stigma cream-coloured, very stout; lobes 5, prominent. Ovary deciduous, 2 to 3 centimetres long, yellowish with red blotches, rather terete with 2 keels, stout, tapers to base. Pedicel ¾ inch long, 5-unequal sided, 5-ridged, 3 ridges prominent; hands rather compact, 7 to 9; fingers rather compact, 11 to 13 in a hand, rather terete with 4 to 5 ridges, all ridges moderately prominent, 5 inches long, 5 inches in circumference; about 115 in a bunch; fruit tapers to apex, apex distinct, stout, ¾ inch long, 4 to 5-ridged, 3 ridges prominent, tip warty; rind medium thick, pulp rather firm, juicy and insipid: fruits are held strongly to the pedicel.

LATIN.—*Musa sapidisiaca* K. C. Jacob, nom. nov. var. *peyladaniana* Jacob.

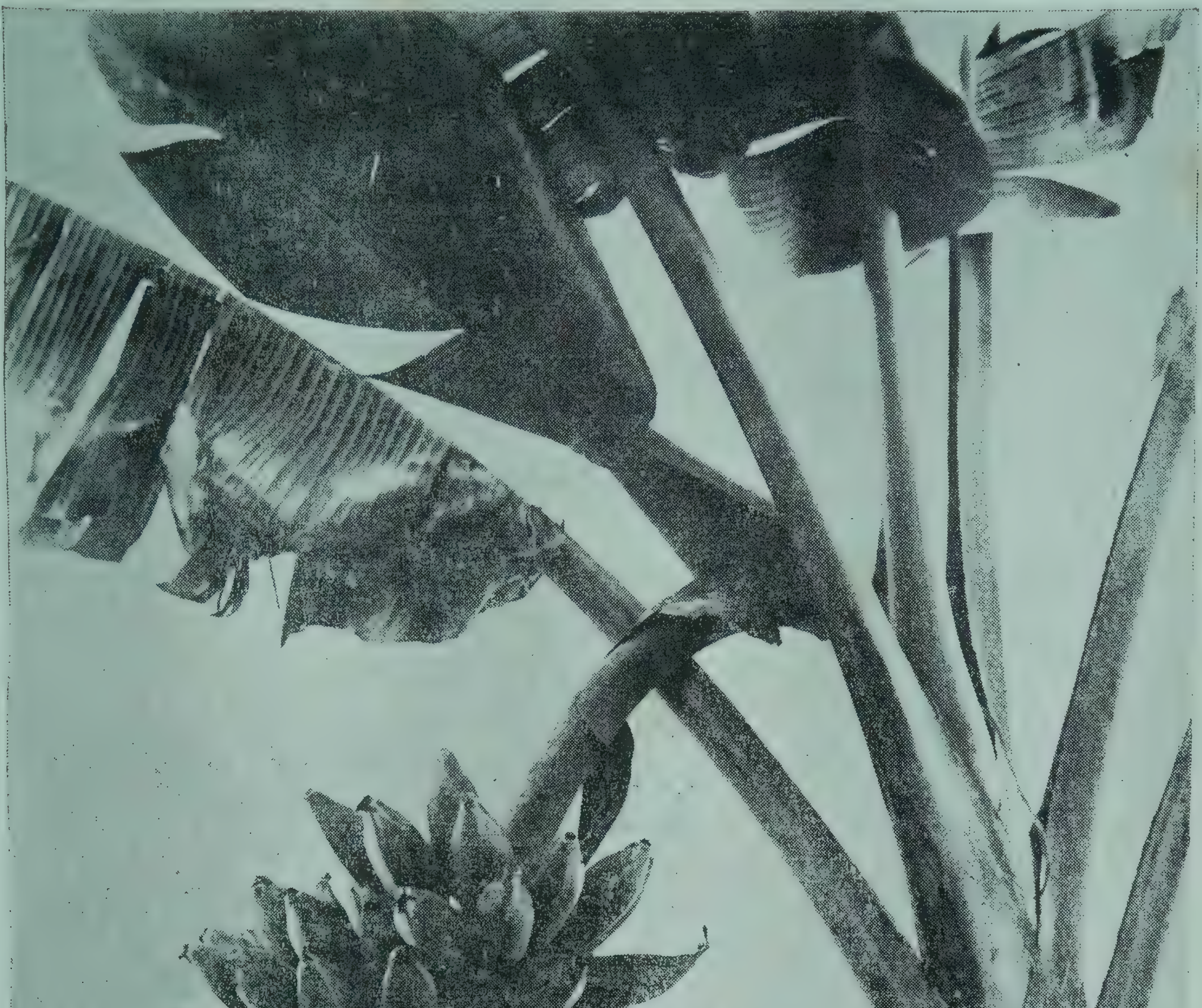
Trunco altissimo et robusto, petiolis robustis, 2 pedibus longis, latere dextro folii ad basim sinistro 1/4 inch breviori latere sinistro cum angusto auriculo 2 inches longo; fructus apice 3/4 inch longo, cacumine verrucoso; fructbus maturis firmiter pedicellis affixis; carne firma nihil sapienti.

MAYIL VAZHAI

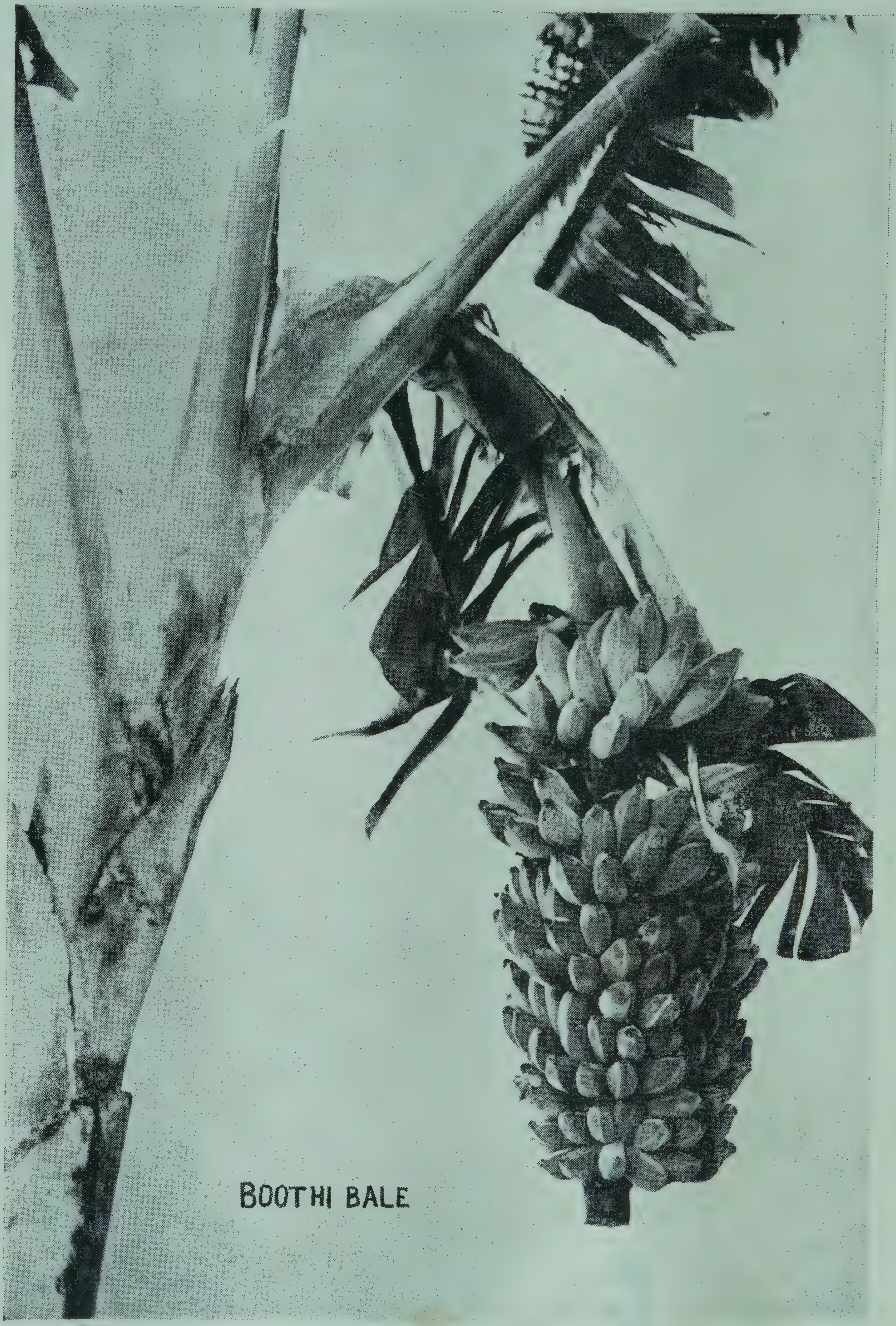
Musa sapidisiaca K. C. Jacob var. *peyladaniana* Jacob forma *mayilvazhaiana* Jacob.

Local names—Madras (Tamil) *Morris vazhai*, *Mayil vazhai*.

It is a medium-sized plant found in stray cultivation in the southern districts of the Madras province. It takes about 14½ months to mature from time of planting to harvest stage. In spite of the absence of good taste and flavour in ripe fruits they are largely consumed when ripe in all places where they are grown. They are more used as ripe fruits than as curry stuff in the unripe stage. They resemble *Pey ladan* in many respects and differ from it in the small stature of the plant and early fruition.



MAYIL VAZHAI


BOOTHI BALE

Stem greenish yellow with brown blotches, 12 feet high, circumference at base 29 inches. Leaves narrowly oblong, glaucous below ; petiole 20 inches long, circumference 4½ inches, greenish yellow ; channel of petiole ¼ inch wide, ½ inch deep ; lamina 6 feet one inch long, 19½ inches broad ; lamina base right side ¾ inch short, slightly cordate, left side deeply cordate (often breaking) ; apex of lamina right side truncate, left side ¾ right angle. Inflorescence, peduncle glabrous, position of mature bunch about 50°. It has female and deciduous male flowers only ; fertile axis 1¼ foot long, sterile axis about 2 feet long. Bract dark purple, outside very glaucous, inside deep red, margins dark red, pitted longitudinally in lines towards middle, 23 centimetres long, 15·7 centimetres broad ; apex rounded. Flower deciduous male, 8 centimetres long, one centimetre broad, ·8 centimetre deep. Calyx (perigonium) 4·5 centimetres long, 1·2 centimetre broad ; calyx outside yellowish purple ; inside purple, margin hyaline and cream-coloured ; lobes 5, 2 small alternating with 3 large, yellow ; keels 2, not prominent. Petals (scale) 3·3 centimetres long, 2·8 centimetres broad, boat-shaped, margins not touching, white with a purplish hue ; semi-transparent, corrugations 2, one more prominent than the other ; apex very small and broadly obtuse, yellowish. Stamens 5, 4·7 centimetres long, straight, anther bent backwards and overtopping stigma ; filament 2·4 centimetres long, whitish, flat and straight ; anther 2·3 centimetres long, bent back, cream-coloured, anther valves greyish. Pistillode 7·6 centimetres long ; style 3·8 centimetres long, whitish and stiff ; stigma yellowish, lobes 5, indistinct. Ovary 3 centimetres long, white with red blotches, terete, slightly tapers to base, rounded ; pedicel nearly one inch long, 4 to 5-unequal sided, 4 to 5-ridged, 3 ridges prominent ; hands rather compact 6 to 7 ; fingers rather compact, 11 in a hand, terete with 4 to 5 sides of unequal width, 4 to 5-ridged, 3 ridges rather prominent, 4¼ inches long, 4½ inches in circumference, about 75 in a bunch ; fruit tapers to apex, apex stout nearly ¾ inch long, unequally 4 to 5-sided, 4 to 5-ridged, 2 to 3 ridges prominent ; fruit often warty especially towards the apical half ; rind medium thick, pulp rather firm, cream-coloured, juicy and sweet : fruits are held strongly to the pedicel.

LATIN.—*Musa sapidisiaca*—K. C. Jacob, nom. nov. var. *payladaniana* Jacob forma *mayilvazhaiana* Jacob cum *Pay ladan* cognata, a qua differt parva altitudine fructibusque praematuris.

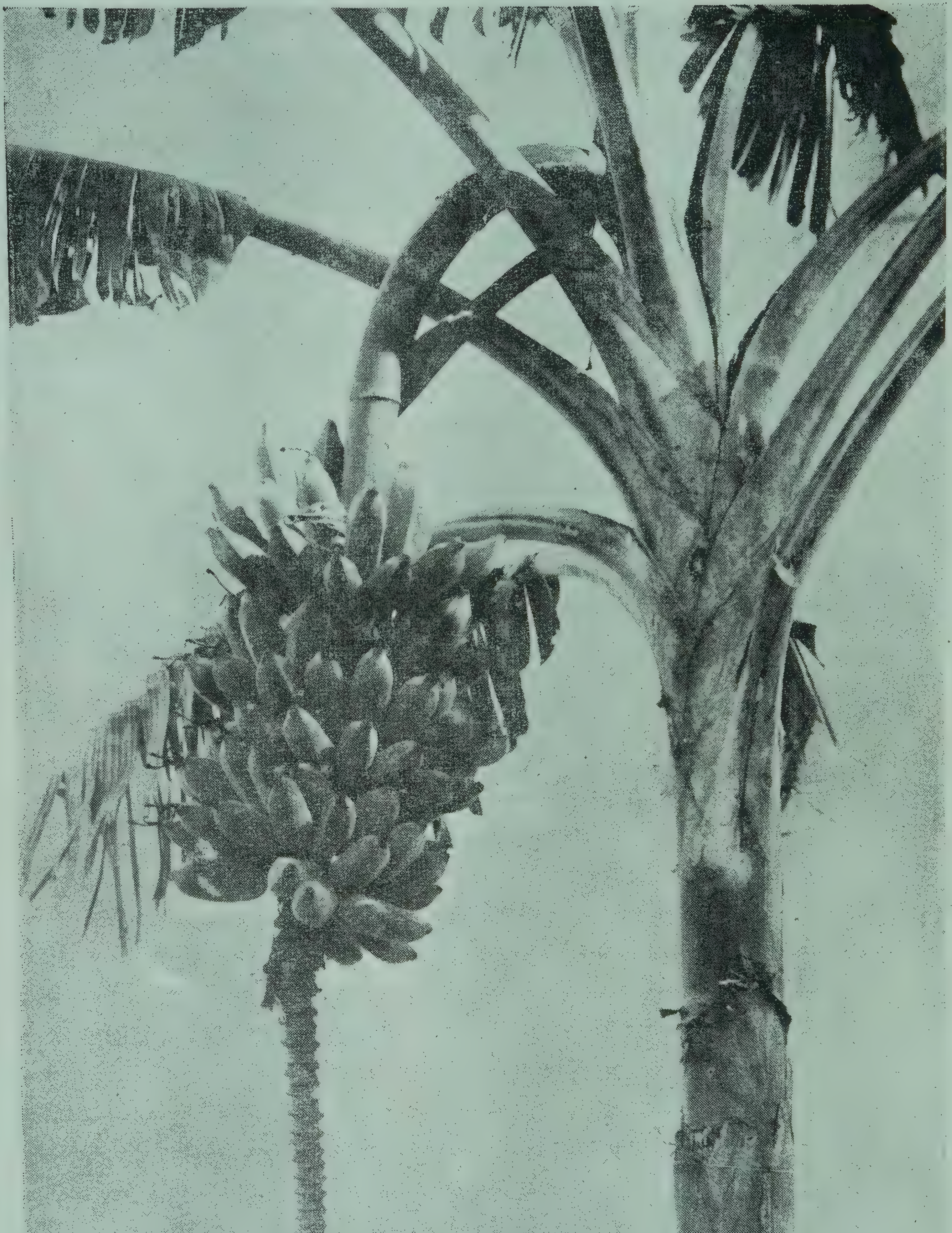
BOOTHI BALE

Musa sapidisiaca K. C. Jacob, nom. nov. var. *boothibaleiana* Jacob.

Local names.—Madras (Kanarese) *Bonha bale, Boothi bale, Gobra bale* ; (Malayalam) *Onakkan mannan, Venneethan.*

It is a tall and stout plant with large leaves found mostly in South Kanara, Mysore and Coorg. The fruits are rather short though the bunches are large. This variety is conspicuous in any banana plantation owing to the ashy coating on the fruits. It takes about 18 months to mature from time of planting to harvest stage. The ripe fruits which are of medium quality are considered a specific in the treatment of bleeding piles. The unripe fruits are good for candying. Sometimes in one and the same bunch there will be two or even three clusters of fruits separated from one another by intervals of naked axis.

Stem greenish yellow, 10 to 15 feet high, circumference at base 28½ inches. Leaves glaucous below ; petiole 18 to 21 inches long ; channel of petiole ¾ inch deep, ¼ inch wide ; margin red to 1/12 inch broad (young leaves) ; lamina oblong, 7 to 8 feet long, 33 inches broad ; lamina base equal, both sides very deeply cordate ; apex of lamina right side truncate, left side 67½° ; number of leaves 40 with an average monthly emergence of 3 to 4. Shot blades 2, bottom semi-drooping, 52 inches long (seen outside), lamina portion 37 inches long, 22 inches broad ; top dried except the base, 34½ inches long, lamina portion 5 inches long, 2 inches broad. Inflorescence, peduncle glabrous, 15 inches long ; position of mature bunch 50° to the stem. It has female and deciduous male flowers ; fertile axis 18 inches long, sterile axis 18 inches long. Bract outside deep red, glaucous, obliquely revolute up to half, inside bright red, pitted longitudinally in lines ; 33·2 centimetres long, 22·3 centimetres broad ; apex almost rounded. Flower deciduous male, 9·3 centimetres long, ·9 centimetre broad, ·7 centimetre deep. Calyx (perigonium) 4 centimetres long, 2 centimetres broad, calyx outside purplish, inside pinkish ; lobes 5, the three inner shorter than the two outer which are awl shaped, yellow ; keels 2, rather distinct. Petals (scale) 3·1 centimetres long, 2·7 centimetres broad, boat shaped, semi-transparent, scaly at the margins ; apex acute, straight, ridges 1 to 2. Stamens 5, 5·7 centimetres long, straight ; filament 3·2 centimetres long, white, flat ; slightly grooved inside ; anther 2·6 centimetres long, bent back, shorter than style and stigma, white, brownish at the tip and sides ; anther valve dark brown. Pistillode 9·1 centimetres long ; style 6·2 centimetres long, white ; stigma light brown ; lobes not distinct. Ovary deciduous, 2·9 centimetres long, white with light pinkish tinge near the top, 5-sided, tapering to base. Pedicel nearly one inch long, 5 unequal sided, 5-ridged, 3 ridges prominent ; hands compact, 8 to 10 ; fingers compact, up to 16 in a hand ; terete with 5 unequal



KOSTHA BONTHA

ridges, all prominent ; 4 inches long, 4½ inches in circumference ; apex distinct, 1/3 inch long, 5 unequal sided, 5-ridged, all ridges prominent, about 100 to 120 fruits in a bunch ; ripe fruits do not drop off easily from pedicel ; rind medium thick, ripening to dull yellow due to the bloom ; pulp cream-coloured, rather hard, juicy and sweet.

LATIN.—*Musa sapidisiaca*—K. C. Jacob, nom. nov. var. *boothibaleiana* Jacob.

Plantae altae et robustae, basi foliorum lateribus aequalibus, profunde cordata ; fructibus potius parvis pelli cinerea ; fructibus maturis pedicellis firmiter affixis ; carne potius dura, sucosa et dulci.

KOSTHA BONTHA

Musa sapidisiaca K. C. Jacob, nom. nov. var. *kosthabonthana* Jacob.

Local names.—Madras (Tamil) *Karpura vazhai, Raja vazhai* ; (Telugu) *Kostha bontha* ; Assam—*Manuva kola.*

It is a tall and stout plant with large leaves found only at Conjeevaram and Palambakkam in the Chingleput district and Palteru in the Vizagapatam district in the Madras province. The heavy bunches with the medium-sized fruits bent back to the base of the bunch are adapted for easy handling in transport. It takes about 19 months to mature from time of planting to harvest stage. The author found by actual cultivation that it thrives even in alkaline soils. It is a useful discovery since bananas are known to thrive only in non-alkaline soils. The ripe fruits have a pleasant taste and flavour ; the bunches and fruits are of good size. This variety, therefore, deserves to be grown widely.

Stem light green with purplish tinge, 9½ feet high, circumference at base 32 inches. Leaves glaucous below, petiole yellowish green, glaucous, 1½ feet long, circumference 5 inches ; channel of petiole ¼ inch wide, ¾ inch deep ; margin of petiole with a dark brown line ; lamina 6½ feet long, 26 inches broad, oblong ; lamina base right side one to 1½ inches short, cordate to deeply cordate and folded at the base ; left side folded and auricled ; auricles 2 inches deep ; apex of lamina right side truncate, left side 80° ; number of leaves 42 with an average monthly emergence of 3. Shot blades 3, bottom erect or drooping, 38 inches long (seen outside) ; lamina portion 8½ inches long, 3 inches broad ; top (dried) 18 inches long, lamina portion one or two inches long. Inflorescence, peduncle glabrous, 17½ inches long ; circumference 7½ inches ; position of mature bunch 22½° to the stem. It has female and deciduous male flowers only; fertile axis 1¼ to 1½ feet long, sterile axis 2 to 3 feet long, pendulous; bases of wrists prominent. Bract outside light purple, very glaucous, inside red and dark red towards margins; 25 centimetres long, 19·2 centimeters broad; apex broadly rounded. Flower deciduous male, 8·5 centimeters long, ·6 centimetre broad, 1·2 centimetre deep. Calyx (perigonium) 5·7 centimetres long, 1·7 centimetres broad towards base; calyx outside reddish cream-coloured, inside cream-coloured and reddish in the centre; margins hyaline; lobes 5, 2 small alternating with 3 large, the two end ones have an awl shaped process, yellowish; keels 2, fairly prominent. Petals (scale) 2·7 centimetres long, 2·8 centimetres broad; 2 sides erect; ridges 3, first ridge is not continuous but is like two short horns coming from either side to the centre; apex pointed, erect; ridge one. Stamens 5, 5·5 centimeters long with a bent at the junction, filament 2·7 centimetres long, whitish, very flat; anther 2·5 centimetres long, tapers to a point, not prominent, dark; anther valves dark brown. Pistillode 8·4 centimetres long, style 5·8 centimetres long, whitish; stigma yellowish brown, lobes not distinct, sticky. Ovary deciduous, 2·5 centimetres long, whitish, 5-sided, tapers to base with a red blotch towards base; wrist ½ inch broad, pedicel ½ inch long, 4 unequal sided, 4-ridged, all ridges prominent; hands rather compact, 8 to 9; fingers rather compact, turned towards base, 13 to 14 in a hand, rather terete with 4 ridges, 3 ridges prominent; 4½ inches long, 5¼ inches in circumference; apex distinct, ¼ inch long, 4-ridged, 3 ridges prominent; about 100 in a bunch; ripe fruits persistent on the pedicel; rind medium thick, ripening to yellow; pulp cream-coloured, juicy and sweet.

LATIN.—*Musa sapidisiaca*—K. C. Jacob, nom. nov. var. *kosthabonthana* Jacob.

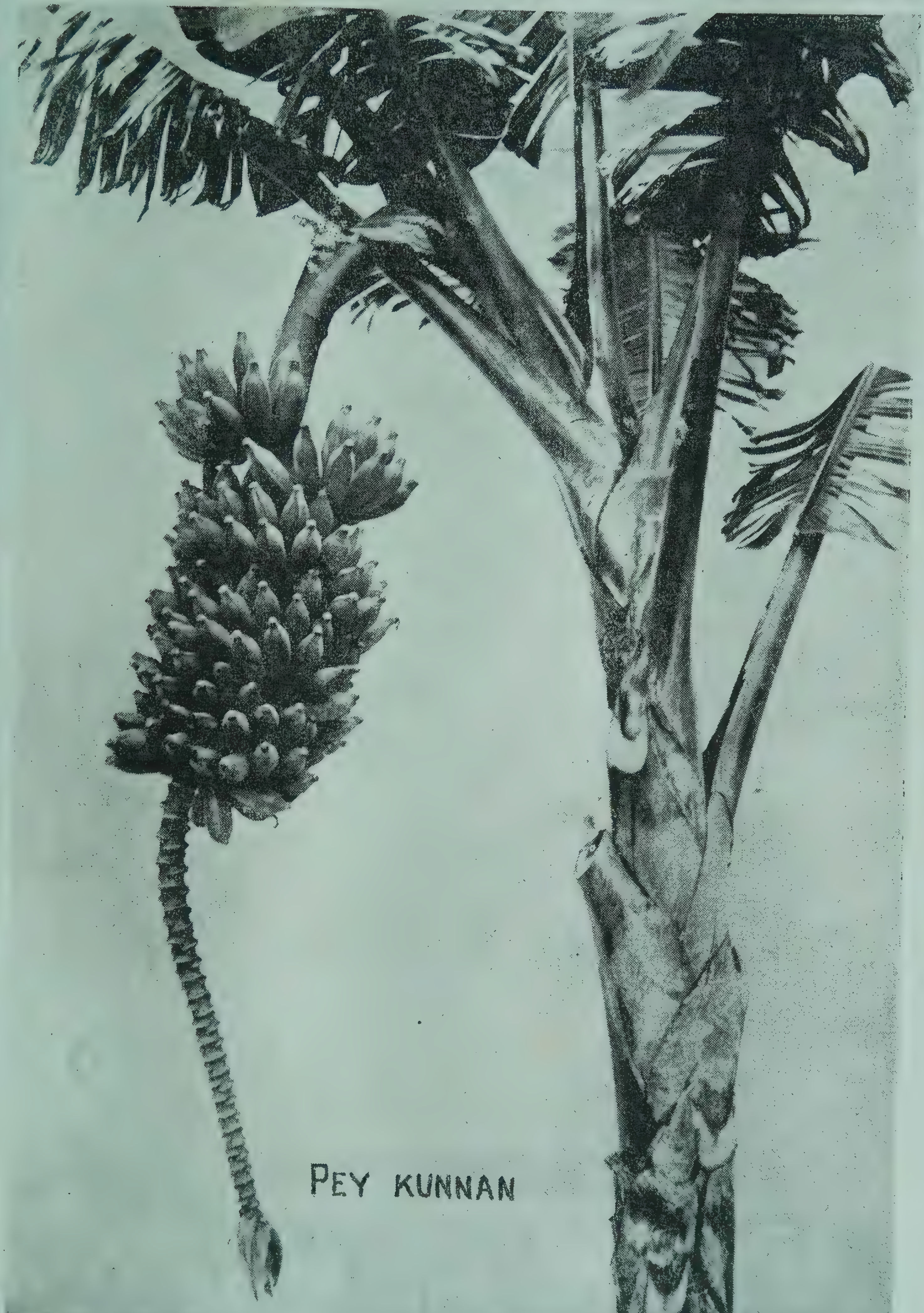
Varietas longae durationis, a tempore quo seritur usque ad fructrum maturitatem 19 mensibus elabentibus, etiam alkalino solo crescens; basis folii latero dextro cum auriculo 2 inches longo; fructibus ad pedunculum recurvatis; fructibus maturis pedicellis firmiter affixis; carne solida et dulci.

PEYKUNNAN

Musa sapidisiaca K. C. Jacob, nom, nov. var. *peykunnaniana* Jacob.

Local names.—Madras (Tamil) *Sambrani*; (Malayalam) *Awak legor*; Foreign—Awak legor.

It is a tall and stout plant found only in two places in the Madras province, viz., Yercaud hills, Salem district, and Trichur farm, Cochin State. This variety has been introduced here in recent years from Ceylon. The heavy bunches with the medium-sized



PEY KUNNAN

fruits resemble *Poovan*. It takes about 17 months to mature from time of planting to harvest stage. This variety was found to stand alkalinity by the author. The ripe fruits have very good taste; the bunches and fruits are of fairly large size. The fruits are closely set on the bunches and do not drop off easily; hence they are adaptable for easy transport. The ripe fruit makes excellent banana 'figs.' It deserves, therefore, to be grown very widely in all kinds of soils.

Stem light green with pinkish tinge, 9½ feet high, circumference at base 30 inches. Leaves glaucous below, leathery; petiole yellowish green and glaucous, 19 inches long, circumference 4¾ inches; channel of petiole ¾ inch deep, margins overlapping with a dark line; lamina linear oblong, 6¾ feet long, 24½ inches broad, lamina base ½ inch short, deeply cordate; left side narrowly auricled, auricle one inch deep; apex right side truncate, left side 80°; number of leaves 44 with an average monthly emergence of 3 to 4. Shot blades 2, bottom erect or drooping, 35 inches long (seen outside); lamina portion 28½ inches long, 15½ inches broad; top (dried) 23 inches long, lamina portion 2½ inches long, 1½ inches broad; distance between the 2 shot blades one foot (seen outside) and the rest inside the pseudostem. Inflorescence, peduncle glabrous, 22 inches long, circumference 7½ inches; position of mature bunch 35° to the stem. It has female and deciduous male flowers only; fertile axis 1½ feet long, sterile axis 2 to 3 feet long, pendulous. Bract outside light purple, very glaucous, inside dark red, pitted in rows below the middle, margins dark in colour, 21·3 centimetres long, 17·5 centimetres broad; apex nearly rounded with a minute notch at the apex. Flower deciduous male, 7·7 centimetres long, ·3 centimetre broad, 1·1 centimetre deep. Calyx (perigonium) 5·3 centimetres long, 1·5 centimetres broad; calyx outside and inside white with light purplish streaks; margins yellowish and hyaline; lobes 5, 2 very small alternating with 3 small ones, yellowish; keels 2, not prominent. Petals (scale) 2·9 centimetres long, 1·8 centimetres broad, boat shaped, the two sides not touching; ridges 2, not prominent; apex short, acuminate, erect, without any ridge. Stamens 5, 5·2 centimetres long, erect; filament 2·6 centimetres long, white, slightly flat; anther 2·5 centimetres long, erect, tip slightly bent back, whitish; anther valves brown. Pistillode 7·4 centimetres long, style 5·2 centimetres long, white; stigma yellowish brown; lobes 5, indistinct. Ovary deciduous, 2 centimetres long, white, tapers to base, partially terete, back side flat and the rest terete; pedicel ¾ inch long, 5 unequal sided, 5 ridged; hands compact, 10 to 12; fingers very compact, 16 to 17 in a hand, rather terete with 5 ridges, one or two ridges prominent ; 4¾ inches long, 4½ inches in circumference ; apex 5/8 inch long, 4 to 5 unequal sided, 4 to 5-ridged, 3 ridges prominent ; about 120 in a bunch ; ripe fruits do not easily drop off from the pedicel ; rind medium thick ripening to yellow ; pulp cream-coloured, juicy and sweet.

LATIN :—*Musa sapidisiaca*—K. C. Jacob, nom. nov. var. *peykunnaniana* Jacob.

Plantae altae et robustae, fructibus post 17 menses maturantibus ; ut *Kostha bontha* solo etiam alkalino crescentes ; petioli margines uni alteri imminentes ; basis folii latus dexterum cum angusto auriculo 1 inch longo ; fructus manipuli magni et ponderosi, valde compressi ; fructus maturantes pedicellis firmiter affixi ; caro firma et dulcis.

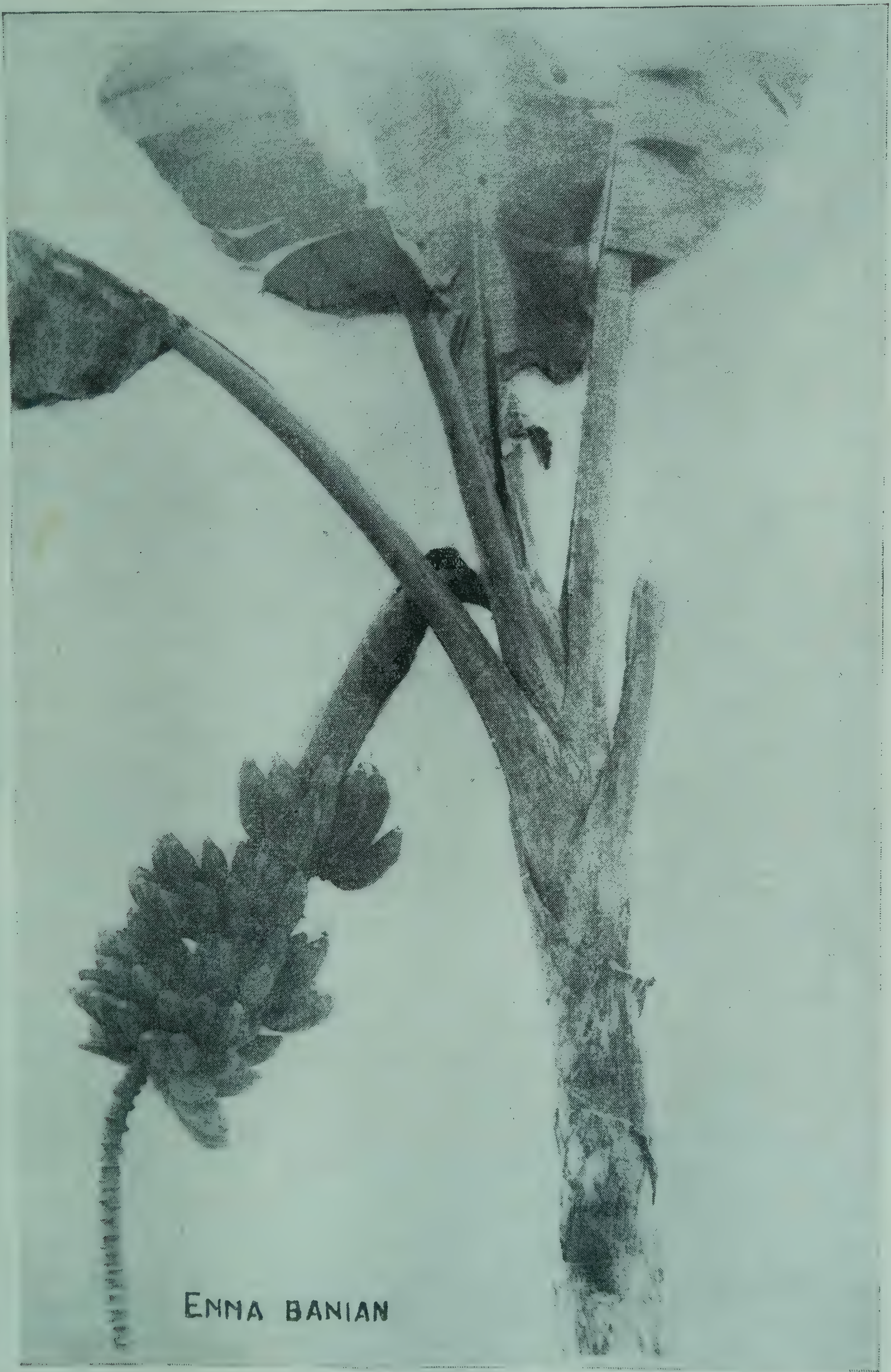
ENNA BENIAN

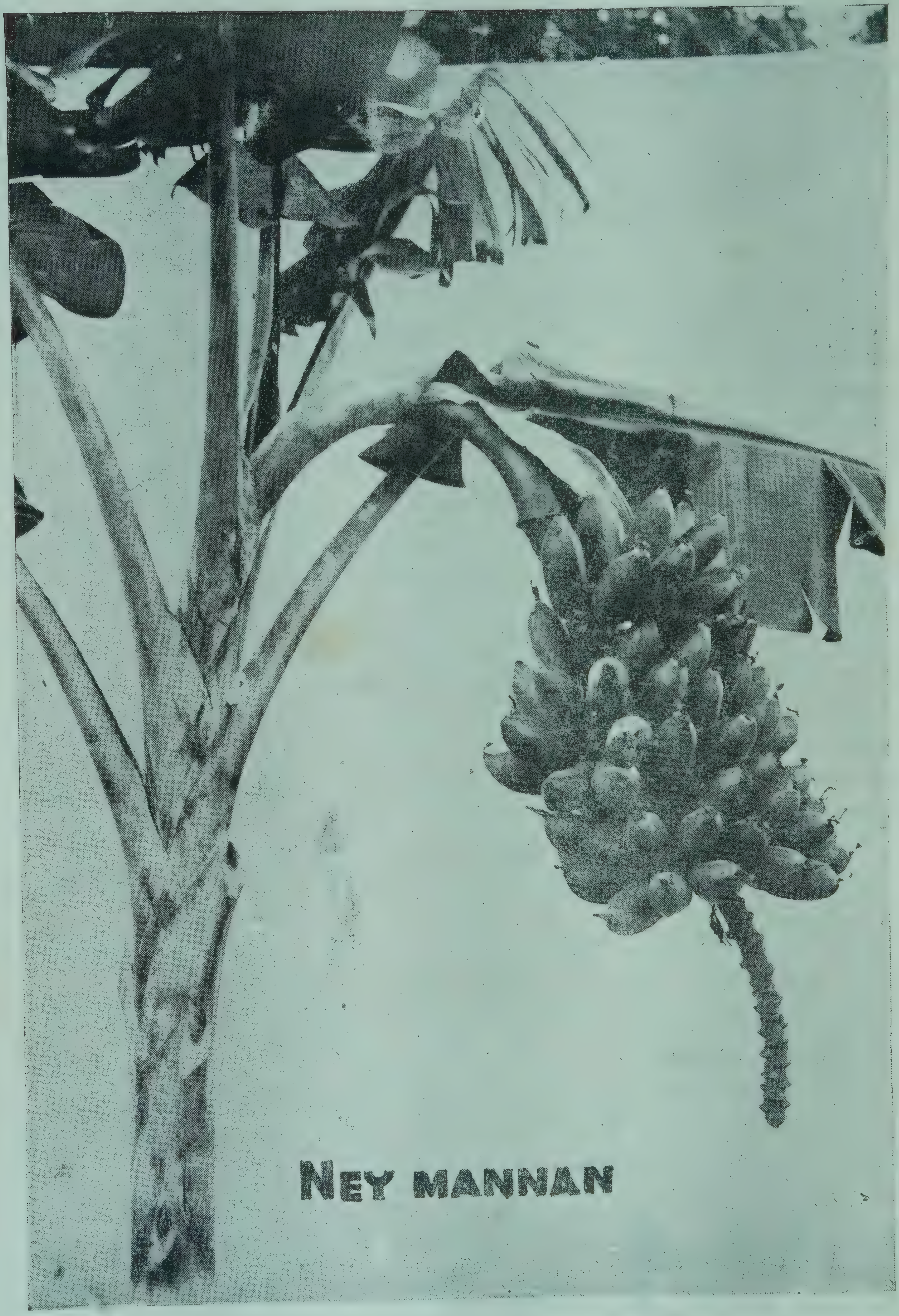
Musa sapidisiaca K. C. Jacob, var. *ennabenianana* Jacob.

Local names.—Madras (Tamil) *Enna benian.*

It is a medium-sized plant found only at Pallur in the North Arcot district of the Madras province. The rind of the unripe fruit is shining when grown in its original habitat ; hence the local name Enna benian—oily banana. They are, however, slightly glaucous when grown at Coimbatore. Unripe fruits are often used as curry stuff ; ripe fruits are also sometimes consumed. It takes about 14 months to mature from time of planting to harvest stage.

Stem light green, 9½ feet high, circumference at base 34½ inches. Leaves oblong, glaucous below ; petiole 17½ inches long, circumference 5 inches, channel of petiole ¼ inch wide, ¾ inch deep ; lamina 6⅛ feet long, 25 inches broad ; lamina base sub-equal, right side cordate, left side deeply cordate ; apex of lamina right side truncate, left side ¾ right angle. Shot blades 2 often erect, sometimes drooping; bottom 57 inches long (seen outside); lamina portion 47 inches long, 20¼ inches broad ; top often dried, occasionally green, drooping, 24 inches long, lamina portion 8 inches long, 6 inches broad. Inflorescence, peduncle glabrous, about 15 inches long ; position of mature bunch half a right angle. It has female and deciduous male flowers only ; fertile axis 12 to 15 inches long, sterile axis 2 feet long, drooping. Bract outside light purple, very glaucous, inside light red, darker towards margin, 23·5 centimetres long, 13·5 centimetres broad ; apex broadly rounded. Flower deciduous male, 6·5 centimetres long, ·5 centimetre broad, ·7 centimetre deep. Calyx (perigonium) 6·4 centimetres long, 1·3 centimetre broad ; calyx outside reddish white, inside reddish with 2 dark bands ; lobes 5,


ENNA BANIAN



NEY MANNAN

two small alternating with 3 large, yellowish ; keels 2, not prominent. Petals (scale) 3 centimetres long, 3 centimetres broad, boat-shaped, 2 sides erect ; ridges 2, prominent ; apex blunt, erect ; ridges 2, prominent. Stamens 5, 4·8 centimetres long, slightly bent at the junction of the anther and filament ; filament 2·5 centimetres long, whitish, strap shaped ; anther 2·3 centimetres long, tapers to a blunt point, brown ; anther valves dark brown. Pistillode 6·4 centimetres long ; style and stigma 4·5 centimetres long, whitish ; style 4·5 centimetres long, whitish ; lobes not distinct, rather sticky. Ovary deciduous, 2·2 centimetres long, pinkish white ; almost round with a flat side, tapers to base. Pedicel ¾ inch long, unequally 5-sided, 5-ridged, 3 ridges prominent ; hands rather loose, 5 to 7 ; fingers rather loose, up to 12 in a hand ; 5-unequal sided, with 2 broader sides convex ; 4 inches long, 4½ inches in circumference, fruit tapers to apex ; apex rather stout, ½ inch long, tip warty ; about 60 in a bunch ; ripe fruits are strongly held to the pedicel ; rind thick, ripening yellow ; pulp cream-coloured, juicy, very soft and insipid.

LATIN.—*Musa sapidisiaca*—K. C. Jacob, nom. nov. var. *ennabenianana* Jacob.

Varietas coquinaria ; plantae altitudine media ; pellis fructuum immaturorum in locis habitualibus lucens, sed in urbe coimbatorensi, ubi colitur, cum cano cereo tegumento (bloom) ; fructus inaequaliter 5-laterales ; apex potius robustus, 1/2 inch longus ; fructus maturi pedicellis firmiter affixi ; caro mollissima nihil sapiens.

NEY MANNAN

Musa sapidisiaca K. C. Jacob, nom. nov. var. *neymannaniana* Jacob.

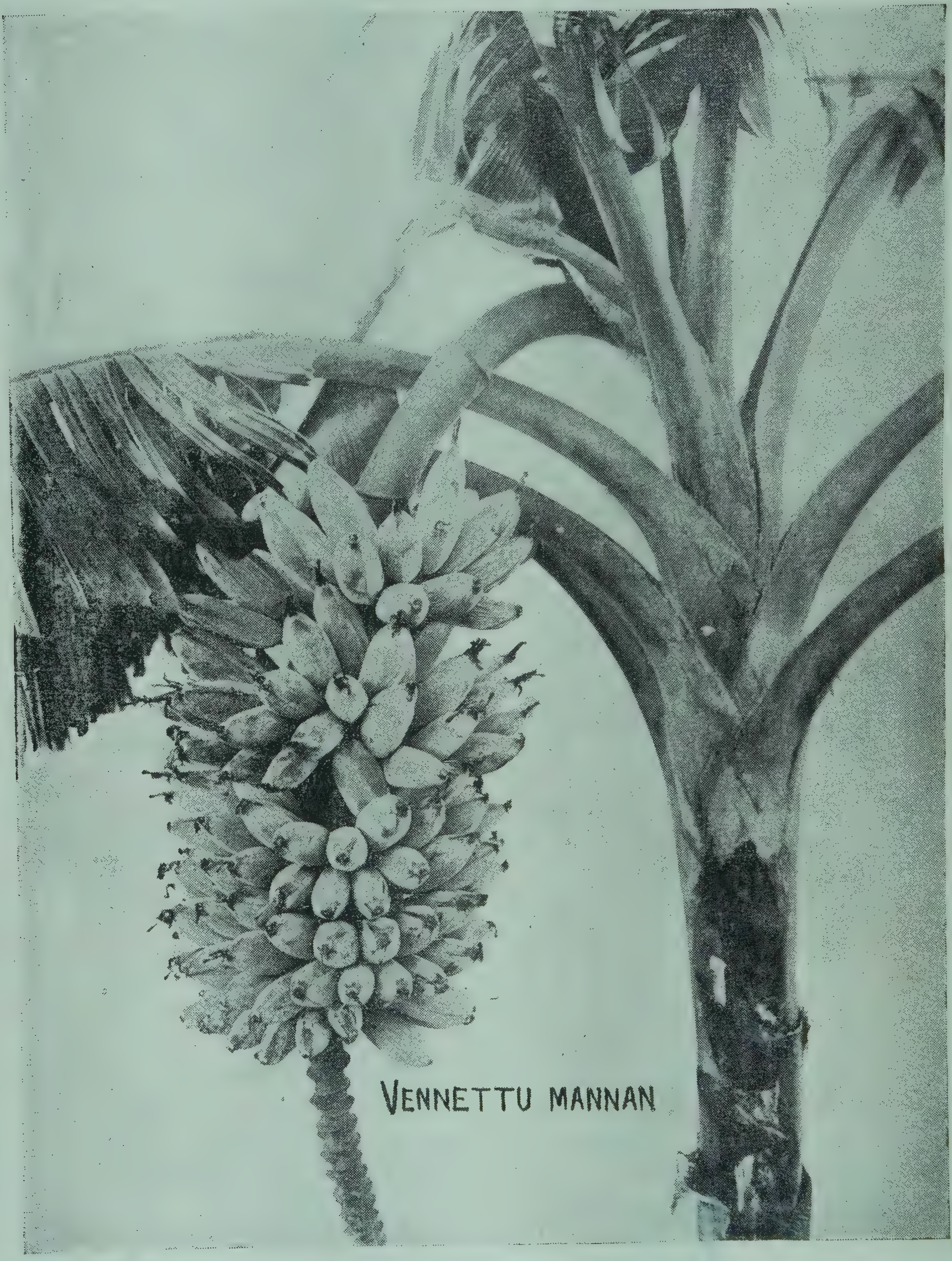
Local names.—Madras (Tamil) *Nattu vazhai*, *Peyan* (Nanguneri, Tinnevelly), *Vayakkathu Kayi*, *Vayal vazhai* ; (Telugu) *Kamalapuram* ; (Kanarese) *Kari bale* ; (Malayalam) *Chara kaali*, *Chathura kaali*, *Cherathali*, *Iyyanmannan*, *Kallu vannan*, *Mala mundi*, *Ney vannan*, *Padinharan*, *Pey monthan*, *Theeyan mannan* ; (Hind.) *Javari*, *Bhysi mouze* ; Orissa—*Mendhi bental* ; Ceylon—*Alukehel.*

This variety is of medium height with stout stem and large leaves. The bunches are heavy and fruits are fairly closely set on the axis. It takes about 14 months to mature from time of planting to harvest stage. It is extensively cultivated in the southern districts of Madurai, Ramanathapuram and Tirunelveli. The unripe fruits are mainly used as curry stuff. Ripe fruits which are rather insipid, are sometimes consumed wherever it is grown largely.

Stem pale green, slightly glaucous, 10 to 13 feet high, circumference at base 24 to 32 inches. Leaves oblong, polished above, slightly glaucous below; petiole yellowish green, 16 to 21 inches long, circumference 5 inches, channel of petiole 1/3 inch wide, ¾ inch deep; margin of petiole a thin brown line, lamina 6 to 6½ feet long, 24 to 27 inches broad; lamina base right side ⅛ inch short, auricled, auricles 2 inches deep; left side auricled, auricles 2 inches deep; apex of lamina right side truncate, left side ¾ right angle; number of leaves 33 with an average monthly emergence of 4. Shot blades 2, bottom 30 inches long, lamina portion 13 inches long, 12 inches broad; top 18½ inches long, lamina portion 2 inches long, 1¾ inches broad; distance between the two 11½ inches; inflorescence, peduncle glabrous, 2 feet long, circumference 6 inches; position of mature bunch 30° to the stem at first and then almost parallel to it. It has female and deciduous male flowers only; fertile axis 14 to 18 inches long, deciduous portion 1½ to 2 feet long. Bract outside purple, glaucous, inside deep red, shining, broadly oblong, 24·4 centimetres long, 17·4 centimetres broad; apex broadly rounded with a minute notch. Flower deciduous male, 7 centimetres long, 8 millimetres broad, one centimetre deep. Calyx (perigonium) 4·7 centimetres long, 1·5 centimetres broad; margin hyaline, cream-coloured; calyx outside reddish white, inside dark red; lobes 5, 2 small alternating with 3 large, yellow; keels 2 to 3, not prominent. Petals (scale) 2·8 centimetres long, 2·2 centimetres broad, boat-shaped, margins not touching, semi-transparent, purplish white; ridges one to 3, variable; apex short, broad, straight, yellowish. Stamens 5, 4·5 centimetres long, filament 1·8 centimetres long, white with reddish tinge, slightly flat; anthers 2·7 centimetres long, well developed, cream-coloured; anther valves greyish, pollen present. Pistillode 6·7 centimetres long; style 4·7 centimetres long, whitish, erect; stigma yellowish brown, lobes not distinct. Ovary deciduous, 2 centimetres long, cream-coloured with light red blotches, tapers to base; pedicel 1⅓ inch long, 5 unequal sided, 5-ridged, all ridges prominent; hands rather compact, 8; fingers rather compact, 12 in a hand, terete with 5 prominent ridges; 6 inches long, 6½ inches in circumference; about 60 to 80 in a bunch; fruit tapers to an indistinct apex; apex warty; ripe fruits do not easily drop off from the pedicel; rind very thick, ripening yellow; pulp juicy, soft, cream-coloured and insipid.

LATIN.—*Musa sapidisiaca*—K. C. Jacob, nom. nov. var. *neymannaniana* Jacob.

Varietas coquinaria, basis folii latere dextero sinistro 1/8 inch breviori, cum anriculis 2 inch. longis ambobus lateribus; apice vix ullo, fructibus maturis pedicellis firmiter affixis; fructus pelli pingui; carni molli nihil sapienti.


VENNETTU MANNAN

VENNEETTU MANNAN

Musa sapidisiaca K. C. Jacob—Var. *venneettumannaniana* Jacob.

Local names.—Madras (Tamil) *Peyan* (Palamcottah, Tinnevelly), *Samba vazhai* ; (Telugu) *Boodithi* ; (Kanarese) *Boothi bale* (Rampuram, Bellary), *Boothi javari* ; (Malayalam) *Chara kaali*, *Venneettu mannan*, *Venneettu vannan* ; Ceylon—*Alukhel*, *Sambal*.

This variety is of medium height with stout stem and large leaves found in stray cultivation along with *Ney mannan*. The bunches are heavy and conspicuous with ashy coating on the rind of the fruits, especially before ripening. It takes about 14 months to mature from time of planting to harvest stage. It resembles *Ney mannan* in all respects, except the ashy coat on the fruits. The uses also are same as *Ney mannan*. It is a rare variety and not grown anywhere as pure stand.

Stem light green, 8 feet high, circumference at base 27 inches. Leaves broadly elliptic, glaucous below ; petiole yellowish green, 17½ inches long, 5½ inches in circumference, channel of petiole ⅛ inch wide, ¾ inch deep ; lamina 5½ feet long, 29 inches broad ; lamina base right side ½ inch longer than the left, slightly auricled, auricle 1½ inches deep ; left side deeply auricled, auricle 3 inches deep ; apex of lamina right side truncate, left side ¾ right angle ; number of leaves 42 with an average monthly emergence of 3 to 4. Shot blades 3, bottom erect, 4 feet long (seen outside), lamina portion 34 inches long, 22½ inches broad ; second, drooping, green or base alone green, 29 inches long (seen outside), lamina portion 8 to 13 inches long, 6 to 11½ inches broad, top (dried) deciduous, 18½ inches long, lamina portion 2½ inches long, one inch broad. Inflorescence, peduncle glabrous, 20½ inches long, circumference 6¾ inches. It has female and deciduous male flowers only ; position of mature bunch 30°, nearly drooping and parallel to the stem ; fertile axis 1¼ to 1½ feet long ; sterile axis 2½ feet long. Bract, outside light purple, glaucous, inside red, margins dark red, 24·2 centimetres long, 15·8 centimetre broad ; apex rounded with a notch, boat-shaped. Flower deciduous male, 7·4 centimetres long, ·8 centimetre broad, ·6 centimetre deep. Calyx (perigonium) 4·6 centimetres long, 1·4 centimetre broad, calyx outside reddish cream-coloured ; inside red, margins white, hyaline ; lobes 5, normally 3 large alternating with 2 small, occasionally 2 alternating lobes may be placed much lower on the perigonium and may be 3 or 4 times larger than those of the three large ones ; keels 2, not very prominent. Petals (scale) 2·9 centimetres long, 2·4 centimetres broad, pinkish, 2 sides curved ; ridges 2, one very conspicuous ; apex broad, acute, erect. Stamens 5, 4·6 centimetres long, straight ; filament 1·9 centimetres long, whitish, flat, anther 2·8 centimetres long, rather stout, whitish, anther valve grey. Pistillode 7·3 centimetres long, style and stigma 5 centimetres long ; style whitish ; stigma yellowish brown, lobes indistinct, sticky. Ovary deciduous 2·4 centimetres long, greenish white with reddish blotches, nearly rounded. not stout, gradually tapers to base ; wrist prominent. Pedicel 1½ inches long, 5-unequal sided, 5-ridged, all ridges prominent ; hands somewhat compact, 7 to 8 ; fingers rather compact, up to 14 in a hand, terete, 5-unequal sided, 5-ridged, all ridges prominent ; 6 inches long, 6½ inches in circumference, fruit tapers to apex, tip of apex warty ; about 75 in a bunch ; ripe fruits do not drop off easily from the pedicel ; rind thick, ripening to dull yellow, pulp very soft, juicy and insipid.

LATIN.—*Musa sapidisiaca*—K. C. Jacob nom. nov. var. ***venneettumannaniana*** Jacob.

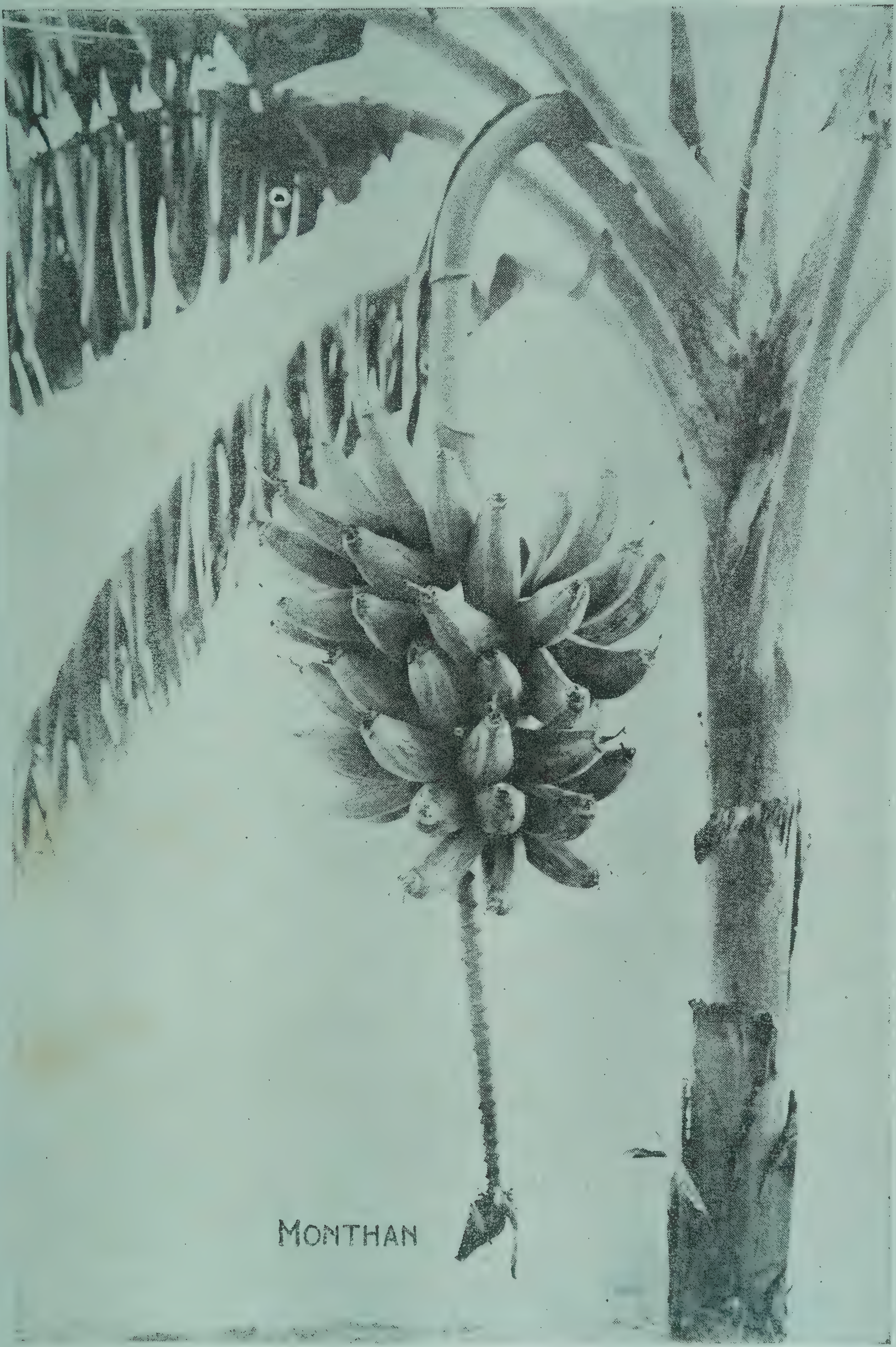
A *Ney mannan* differt pingui cereo tegumento (bloom) latereque sinistro basis folii cum auriculo 3 inch. longo.

MONTHAN

Musa sapidisiaca K. C. Jacob nom. nov. var. *monthaniana* Jacob.

Local names.—Madras (Tamil) *Erode bonthan, Erode monthan, Erode vazhai, Kondai monthan, Maanaathu monthan, Monthan, Naathangi monthan, Nattu monthan, Nielh bontha, Nirbontha, Thoppul vazhai, Yendra monthan, Yenthala monthan, Trichynopoly monthan* ; (Telugu) *Basthi bontha* ; (Kannada) *Akku bale, Aunda bale, Banga bale, Kalyana bale, Kari bale, Kilandi, Konga bale, Mathuranga bale, Manga bale, Mara bale, Silanti* ; (Malayalam) *Chetti kai, Kuppakkaali, Ponnan, Ponthan, Sodari, Thenali, Thezhuthani* ; Central Provinces—*Bhainsa-Kela, Bhainsu* ; Malaya —*Pisang nangka.*

It is fairly a tall and stout plant cultivated throughout the province of Madras and other banana growing tracts of India. The heavy bunches with the large lax fruits with rounded apex look as if they are hanging from the crown of the plant, on account of the long peduncle. It takes about 13½ months to mature from time of planting to harvest stage. It is extensively grown in the southern districts of the Madras province. There is a large trade in the unripe fruits of this variety to be used for culinary purpose. It is good for making banana "chips." Ripe fruits are sometimes consumed in some places and are considered to have laxative


MONTHAN

properties. The fruits are very large, often ¾ to one foot long, and weigh ¾ to 1 lb. each.

Stem light green, 10½ feet high, circumference at base 28 inches. Leaves oblong, glaucous below ; petiole greenish yellow, 19½ inches long, 4⅝ inches in circumference, margin of petiole a dark line, channel of petiole ⅛ inch wide, ¾ inch deep ; lamina 6¾ feet long, 26¾ inches broad, lamina base one inch short, truncate, left side auricled, auricle 1¼ inch deep ; apex of lamina right side truncate, left side ¾ right angle ; number of leaves 37 with an average monthly emergence of 3-4. Shot blades 2, bottom erect, 45½ inches long (seen outside), lamina 44¾ inches long, 20 inches broad ; top (dried) 28 inches long, lamina portion 4 inches long, 2½ inches broad. Inflorescence, peduncle glabrous, 29 inches long, 5¾ inches in circumference ; position of mature bunch drooping and almost parallel to the stem ; it has female and deciduous male flowers only ; fertile axis 1¼ foot long, sterile axis 2 feet long. Bract outside purple, very glaucous, inside deep red and shining, elliptic, apex rounded, 25·3 centimetres long, 16 centimetres broad. Flowers deciduous male, 8·1 centimetres long, 9 millimetres broad and 5 millimetres deep. Calyx (perigonium) 5·1 centimetres long, 1·4 centimetre broad ; keels 2, not prominent, not deeply concave ; outside yellowish red ; inside deep red ; margins scarious and yellowish ; lobes 5, 2 small alternating with 3 large ones, yellow. Petal (scale) 3·1 centimetres long, 2·7 centimetres broad, concave, nearly rounded, scarious, purplish ; apex 3-ridged, acuminate, yellowish. Stamens 5, 4·5 centimetres long ; Filament 1·6 centimetres long, reddish ; anther 2·8 centimetres long, yellowish ; pollen present. Pistillode 5·1 centimetres long, style whitish ; stigma light brown, lobes not distinct. Ovary deciduous, 2·9 centimetres long, greenish yellow with reddish blotches. Pedicel 1½ inches long, 5-unequal sided, 5-ridged, all ridges prominent ; hands loose, 5 to 6, fingers loose, up to 11 in a hand ; terete with 5 unequal sides, 5-ridged, 2 ridges prominent, fruit tapers to apex, apex very short, 2 inches long, 5 inches in circumference, warty at apex ; 8-8¾ inches long, 8 inches in circumference ; about 50 in a bunch ; ripe fruits very persistent on the pedicel ; rind very thick, ripening to yellow ; pulp very soft, juicy and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *monthaniana* Jacob.

Varietas praecipue coquinaria latere dextro folii basis sinistro 1 inch breviori ; latere dextero cum auriculo 1-1/4 inch longo, pedunculo glabro 2-1/2 pedibus longo, manipulis pendulis, manibus digitisque "(fingers)" solutis fructibus 10 inch. longis, circuito 8 inch. ; fructibus maturis pedicllis firmiter affixis, apice robusto, rotundo 2 inches longo ; cacumine verrucoso ; carne molli nihil sapiente.

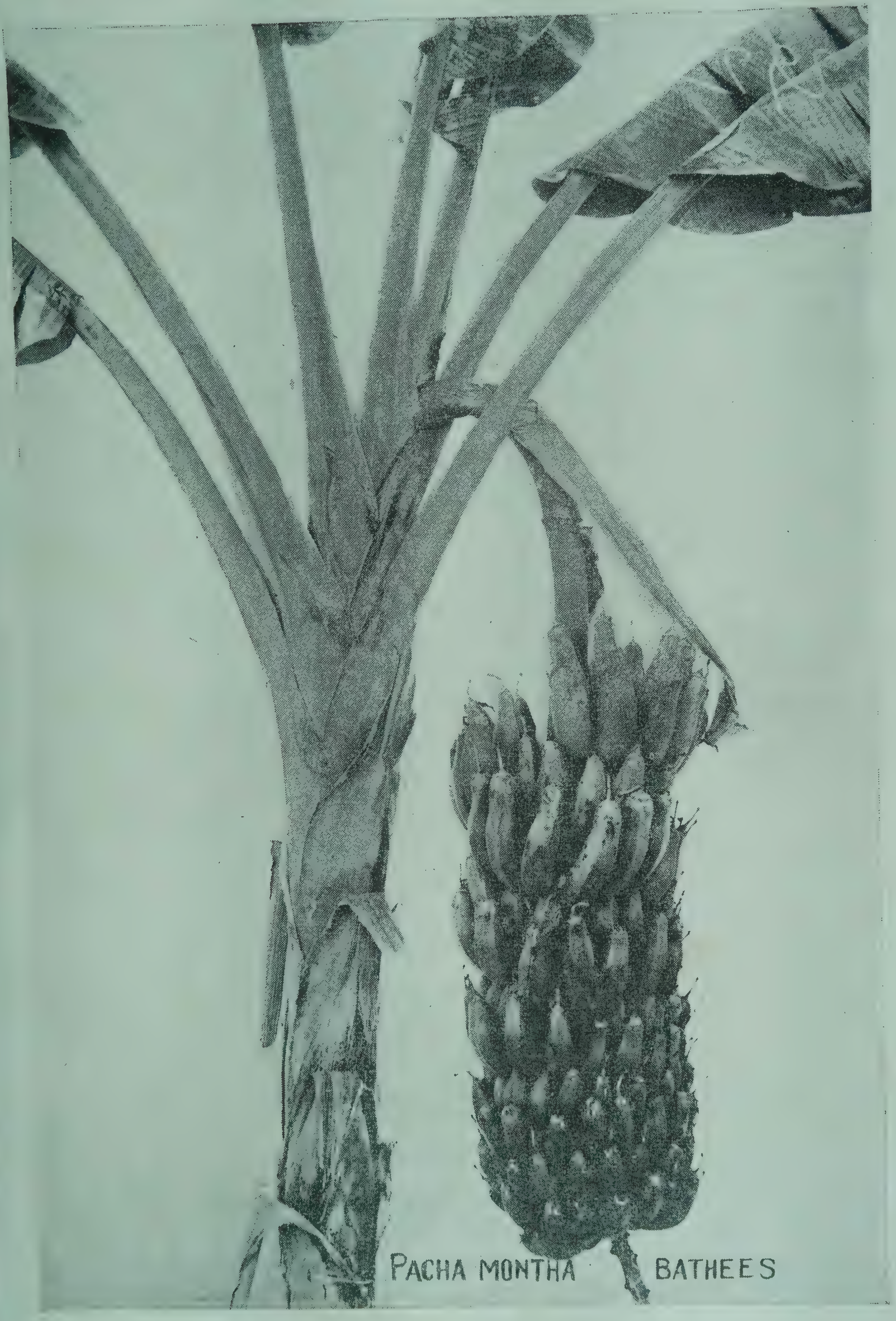
PACHA MONTHA BATHEES

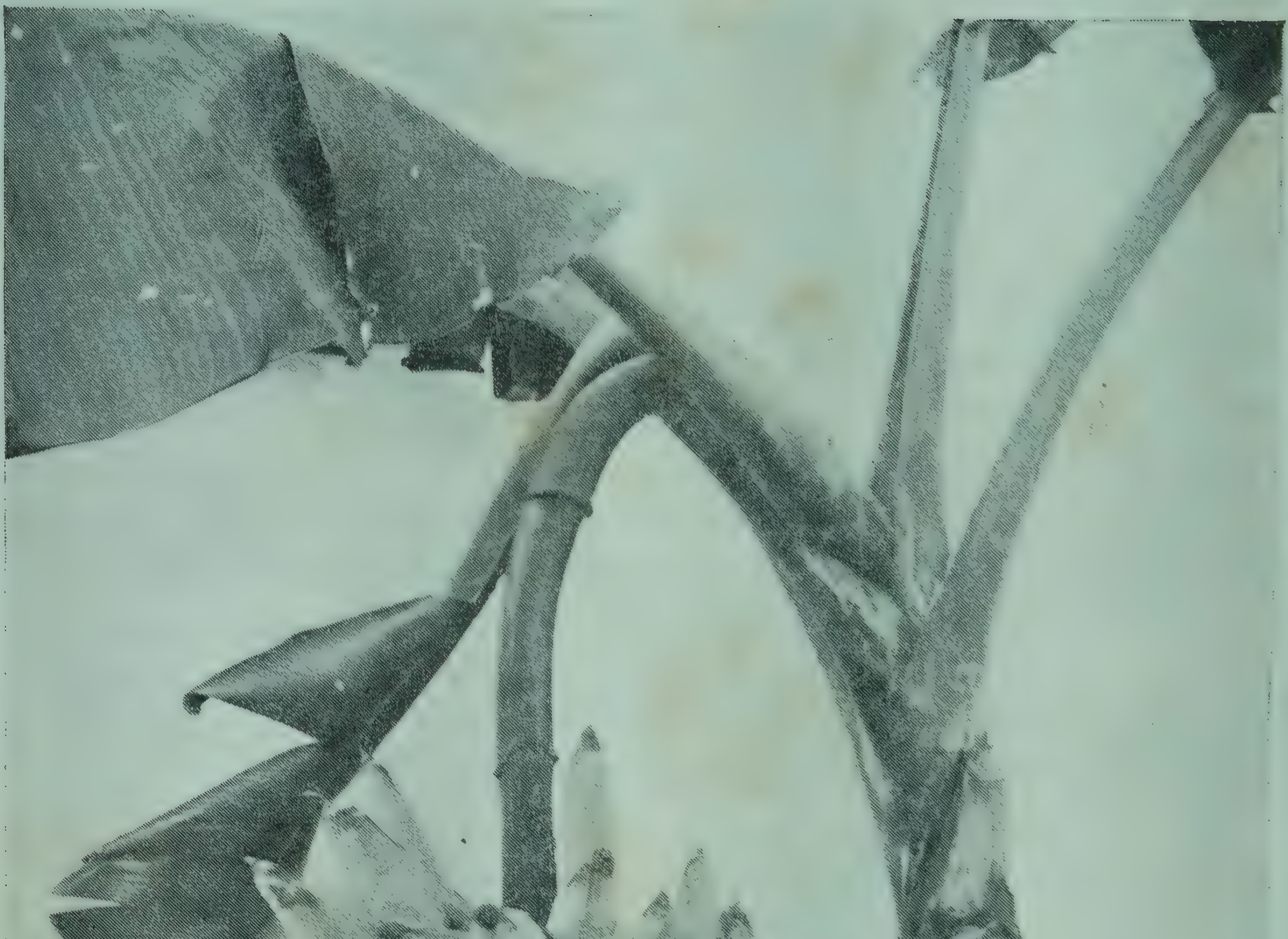
Musa sapidisiaca K. C. Jacob nom. nov. var. *monthaniana* Jacob forma *pachamonthabatheesiana* Jacob.

Local names.—Madras (Telugu) *Bachees*, *Bathaas*, *Batheesa*, *Chundi bontha*, *Gudalur bathees*, *Nalla bathees*, *Nellore bontha*, *Pacha bathees*, *Pacha bontha bathees* ; Orissa—*Batisa bontal.*

It is fairly a tall and stout plant grown in the northern districts of the Madras province. It takes about 15 months to mature from time of planting to harvest stage. It is a sport of *Monthan.* It differs from *Monthan* in having about 15 hands of fruits set on the axis in a congested manner consisting of medium to small fruits arranged in a gradually diminishing manner from base to tip. When this variety was first introduced into Coimbatore from the Northern Circars the author noticed two plants of this variety, out of about half-a-dozen, reverting to the parent type *Monthan.* Unripe fruits are mainly used for culinary purpose. Occasionally the basal fruits are also eaten when ripe. When the fruits are intended to be consumed while ripe the top half of the bunch is cut off soon after the female flowers have opened, leaving alone the basal half, where the fruits are the largest. It is very elegant in bunch and the whole plant is used for purposes of decoration.

Stem yellowish green, $8\frac{3}{4}$ feet high, circumference at base 23 inches. Leaves glaucous below ; petiole 19 inches long, circumference $4\frac{1}{4}$ inches ; channel of petiole $\frac{1}{2}$ inch deep, margins touching ; lamina oblong, 6 feet long, 2 feet broad ; lamina base right side $\frac{3}{4}$ inch short, cordate ; left side narrowly deeply cordate ; apex of lamina right side truncate, left side 50° ; number of leaves 42 with an average monthly emergence of 3 to 4. Inflorescence, peduncle glabrous, 30 inches long ; position of mature bunch nearly parallel to the stem. It has female and deciduous male flowers only ; fertile axis 21 inches long, sterile axis rather stiff, $1\frac{1}{4}$ foot long. Bract outside light purple, glaucous, corrugations towards the basal half very prominent ; inside deep red and dark red towards margins ; 18·4 centimetres long, 12·8 centimetres broad ; apex rounded. Flower deciduous male, 6·2 centimetres long, ·5 centimetre broad. Calyx (perigonium) 3·6 centimetres long, 1·2 centimetre broad, calyx outside cream-coloured with red tinge, inside red ; margins white, hyaline ; lobes 5, 3 large alternating with 2 small ones, deep yellow ; keels 2, prominent in the lower series, not prominent


PACHA MONTHA
BATHEES


SAMBRANI MONTHAN

in the upper series. Petals (scale) 2·3 centimetres long, the two sides erect, boat shaped ; ridge one, very prominent ; apex bent down, pointing downwards. Stamens 5, all equal, undeveloped ; filament ·9 millimetre long, white with pinkish tinge, flat, tapers to top ; anther one millimetre long, abortive and very minute, bent, grey. Pistillode 6 centimetres long, style and stigma 3·6 centimetres long, whitish with pink dots ; stigma yellowish ; lobes fused into a mass ; large. Ovary deciduous, 2·4 centimetres long, whitish with red blotches, 5-unequal sided, oblong, tapers to base ; pedicel 1½ inches long, 4 to 5-unequal sided, 4 to 5-ridged, all the ridges prominent. Hands rather compact, about 20, fingers compact, about 12 in a hand, terete with 4 to 5 unequal sides, 4 to 5-ridged, all ridges prominent, 7 inches long, 6 inches in circumference, diminishing in size towards the top where the length of the fruit is only half the basal ones ; fruit tapers to apex ; apex very stout, 1¼ inch long, unequally 4 to 5-ridged, ridges prominent ; style persistent, base of style accrescent ; about 150 to 200 in a bunch ; ripe fruits strongly held to the pedicel ; rind very thick, ripening to yellow ; pulp very soft, dull white in colour, juicy and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *monthaniana* forma *pachamonthabatheesiana* Jacob.

Sport of *Monthan*, a qua differt manibus fructuum numero circa 15 et modo congesto quo fructus medii ad basim manipuli gradatim ad apicem diminuuntur.

SAMBRANI MONTHAN

Musa sapidisiaca K. C. Jacob nom. nov. var. *sambrani monthaniana* Jacob.

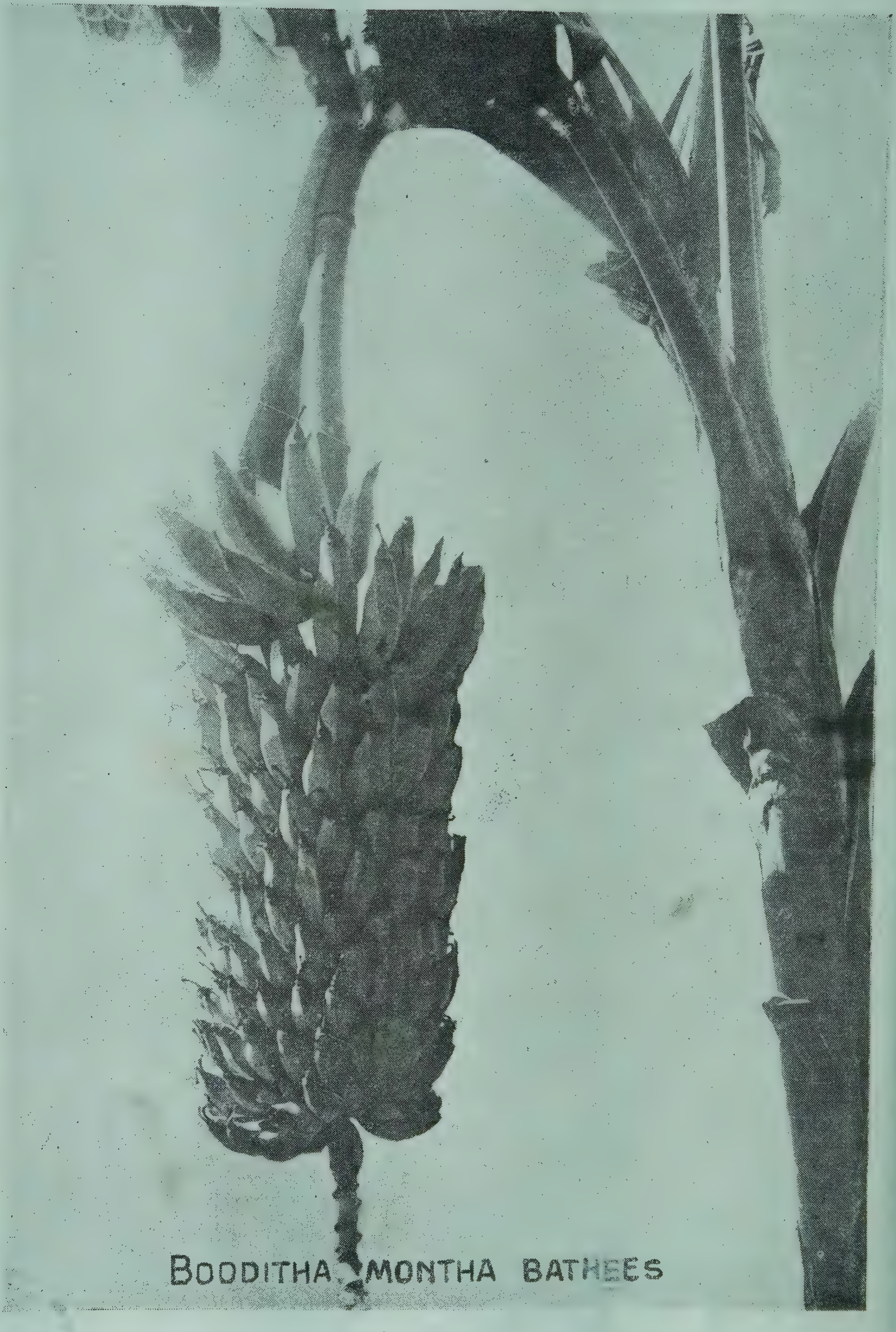
Local names.—Madras (Tamil) *Sambrani monthan*, *Samba monthan*, *Boothan Kaya* ; (Telugu) *Booditha arati* ; (Kannada) *Bonya kilandi*, *Boothi bale*, *Boothi mathuranga*, *Vennittu manga* ; (Malayalam) *Samba monthan*, *Vennittan thezhuthani*.

It is a medium-sized plant found in stray cultivation throughout South India. The bunches with the large lax fruits with rounded apex are conspicuous in any banana plantation due to the ashy coating on the fruits. It takes about 13½ months to mature from time of planting to harvest stage. It is not grown anywhere as pure stand. It differs from *Monthan* in the ashy coat on the fruits. Ashy coated bananas are considered superior to glabrous ones. It is therefore strange why they are not grown to a large extent by banana growers. The size and shape of fruits and their uses are same as *Monthan*.

Stem yellowish green with dark brown blotches near the petioles ; 12½ feet high, circumference at base 30 inches. Leaves oblong polished, leathery ; petiole yellowish green, 26 inches long, circumference $4\frac{3}{4}$ inches ; channel of petiole $\frac{1}{8}$ inch wide, $\frac{3}{4}$ inch deep ; margin of petiole a thin brown line ; lamina $7\frac{1}{8}$ feet long, 25 inches broad ; lamina base right side $\frac{1}{2}$ inch short, slightly cordate, left side slightly auricled, $1\frac{1}{4}$ inch deep ; apex of lamina right side truncate, left side $\frac{3}{4}$ right angle ; number of leaves 34 with an average monthly emergence of 4. Shot blades 2, bottom erect, 35 inches long, lamina portion 24 inches long, 16 inches broad, top 23 inches long, lamina portion $1\frac{1}{2}$ inches long, $1\frac{1}{4}$ inch broad, distance between the two 16 inches long, Inflorescence, peduncle glabrous, 2 feet long, position of mature bunch 25° to the stem at first and then almost parallel to it. It has female and deciduous male flowers only ; fertile axis $1\frac{1}{4}$ foot long, deciduous portion $1\frac{1}{2}$ feet long. Bract outside purple, very glaucous ; margin inside dark purple ; inside red, shining with parallel corrugations, 22·8 centimetres long, 14·8 centimetres broad ; apex rounded. Flower deciduous male, 8 centimetres long, 4 millimetres broad, 9 millimetres deep. Calyx (perigonium) 5 centimetres long, 1·6 centimetres broad, outside reddish yellow, inside red ; margins cream-coloured and hyaline ; lobes 5, 3 large alternating with 2 small, the two end ones with recurved awns ; lobes yellow ; keels 2, not prominent. Petals (scale) 3.3 centimetres long, 2·6 centimetres broad, boat-shaped, hyaline, pinkish ; ridges 2, one very prominent ; apex broad, acute, erect, yellowish ; ridge one, indistinct. Stamens 5, 4·5 centimetres long, straight ; filament 2 centimetres long, cream-coloured, slightly flat, straight ; anther 2·5 centimetres long, bent, recurved, shorter than stigma ; cream-coloured ; anther valves yellowish grey. Pistillode 8 centimetres long, style whitish ; stigma yellowish brown with pinkish dots below the stigma ; lobes not distinct, very sticky, rather stout. Ovary deciduous, 2·9 centimetres long, greenish white with reddish base, nearly rounded with one side flat, tapers to base. Pedicel $1\frac{1}{2}$ inches long, terete with 5 ridges, 3 ridges prominent ; hands loose, 4 to 6 ; fingers, loose, 10 in a hand ; nearly terete with 5 ridges, 2 ridges very prominent ; $7\frac{1}{2}$ inches long, $7\frac{1}{2}$ inches in circumference, about 40 to 50 in a bunch ; fruit tapers to apex, apex very stout, $1\frac{3}{4}$ inches long, nearly terete, 5-ridged, 2 ridges prominent, tip of apex warty ; ripe fruits strongly held to the pedicel ; rind very thick, ripening to dull yellow ; pulp juicy, very soft, cream-coloured and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *sambrani monthaniana* Jacob.

Cum *monthan* cognata, sed ab hac vari elate differt cinereo tegumento fructuum.



BOODITHA MONTHA BATHEES

BOODITHA MONTHA BATHEES

Musa sapidiasiaca K. C. Jacob nom. nov. var. *sambranimonthaniana* Jacob forma *boodithamontha batheesiana* Jacob.

Local names.—Madras (Telugu) *Booditha batheesa, Booditha bontha bathees, Thella bathees.*

It is a medium-sized plant found in stray cultivation in the northern districts of the Madras province. The bunch of fruits is often 2½ to 3 feet long with about 200 fruits of varying size from 7 inches to 2 inches long, gradually diminishing from base to tip. The bunches are conspicuous in any banana plantation due to the ashy coating on the fruits. It takes about 14½ months to mature from time of planting to harvest stage. It is a sport of *Sambrani monthan* and is identical with Pacha montha bathees except that there is an ashy coat on the fruits of this variety. The size of bunch, fruit and uses are same as *Pacha montha bathees.* The author has noticed one plant of this variety reverted to the parent type *Sambrani monthan* when it was first introduced into Coimbatore from the Northern Circars. The whole plant with the bunch is often used for purposes of decoration.

Stem yellowish green with dark brown blotches near the petiole, 10¾ feet high, circumference at base 26 inches. Leaves oblong, polished, glaucous below, leathery ; petiole yellowish green, slightly glaucous, 20 to 23 inches long, circumference 4½ inches ; channel of petiole ¾ inch deep, margins touching ; margin of petiole a thin brown line ; lamina 6¾ feet long, 25 inches broad, lamina base right side ⅜ inch short, cordate, left side auricled, auricle 1½ inches deep ; apex of lamina right side truncate, left side 55° ; number of leaves 42 with an average monthly emergence of 3 to 4. Shot blades 2, bottom 43 inches (seen outside), lamina portion 33½ inches long, 18½ inches broad ; top (dried) 26½ inches long, lamina portion 3½ inches long, 1½ inches broad. Inflorescence, peduncle glabrous, 33 inches long, 6¼ inches in circumference ; position of mature bunch pendulous and nearly parallel to the stem. It has female and deciduous male flowers only ; fertile exis 1½ to 2 feet long, deciduous portion 1½ to 2 feet long, rather stiff. Bract, outside light purple, very glaucous, inside bright red, pitted in lines, broadly ovate, 23·5 centimetres long, 17·5 centimetres broad ; apex rounded. Flower deciduous male, 8·2 centimetres long, 1·5 centimetres broad, 1·3 centimetre deep. Calyx (perigonium) 5·2 centimetres long, 1·5 centimetres broad, margin hyaline, whitish ; calyx outside yellowish red ; inside dark red but yellowish towards the lobes ; lobes 5, 2 very small alternating with 3 fairly large ones, yellowish ;

keels 2, not prominent. Petals (scale) 3·5 centimetres long, 3·1 centimetres broad, boat-shaped, semi-transparent, light purple, ridges 2, prominent; apex acuminate, large, straight or bent, yellowish. Stamens 5, 5·2 centimetres long; filament 2·6 centimetres long, whitish with a slight reddish tinge, flat with a slight groove; anther 2·6 centimetres long, whitish; anther valves grey, pollen present. Pistillode 7·6 centimetres long, style 5 centimetres long, whitish, rather stout, erect; stigma light brown; lobes not distinct. Ovary deciduous, 2·7 centimetres long, whitish with greenish and red tinge, 4 to 5-unequal sided, one side prominent, tapers to base; pedicel 1½ inches long, nearly terete with 3 to 4 ridges, 3 ridges somewhat prominent; hands very compact, 12 to 17; fingers compact, 13 in a hand, terete with 5 ridges, 4 ridges prominent, 4½ to 7 inches long, varying in size from top to bottom; about 125 in a bunch; fruit tapers to apex, apex stout, 1½ inch long, terete with 5 ridges, 3 ridges prominent; tip of apex warty; ripe fruits strongly held to the pedicel; rind very thick, ripening dull yellow; pulp juicy, soft, cream-coloured and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *sambrani monthaniana* forma *booditha monthabatheesiana* Jacob.

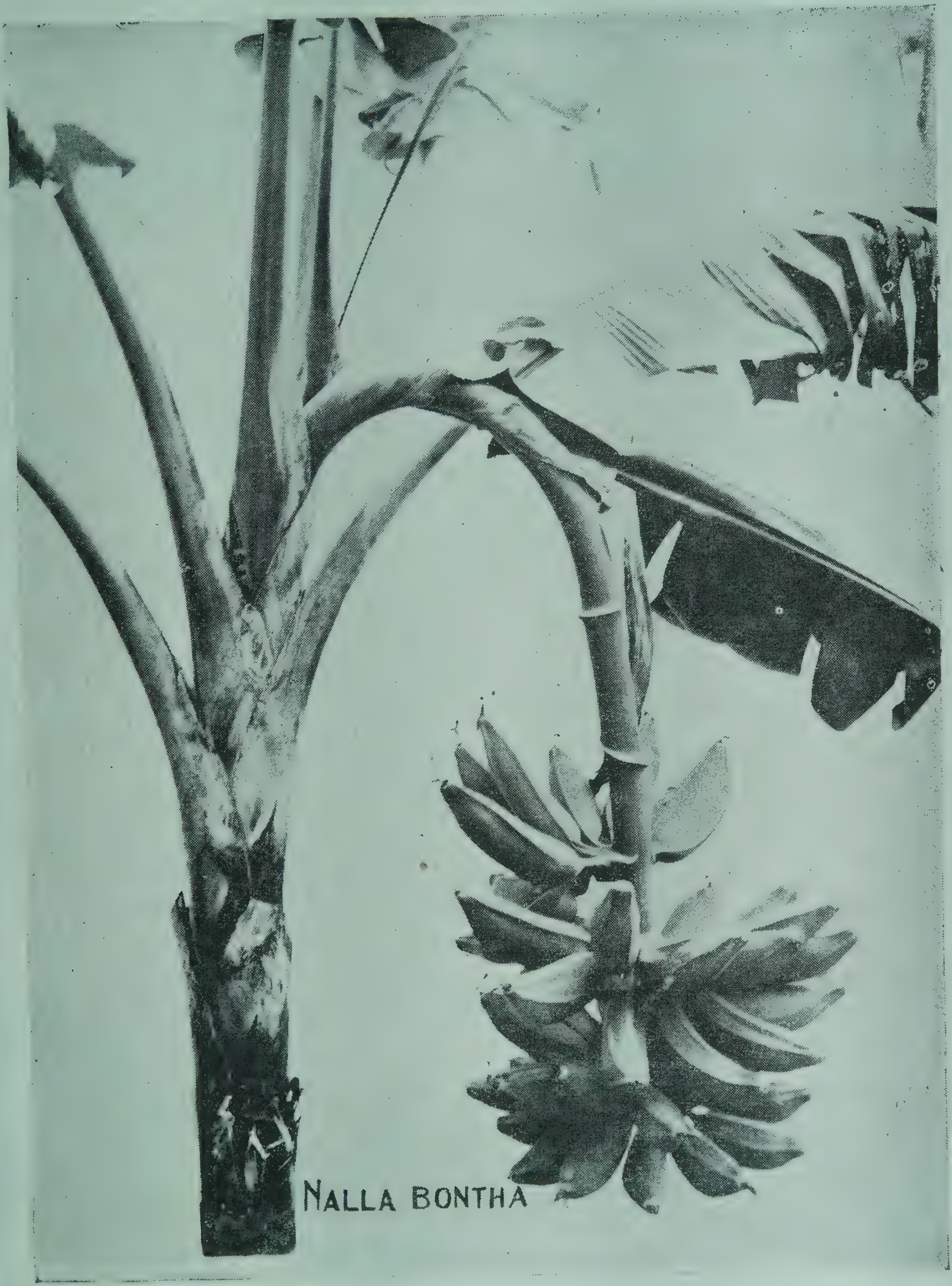
Cum *Pacha montha bathees* counata, sed differt cinereo tegumento fructuum.

NALLA BONTHA

Musa sapidisiaca K. C. Jacob nom. nov. var. *nallabonthana* Jacob.

Local names.—Madras (Tamil) *Bontha*, *Bonthan*, *Chatura monthan*, *Katta bontha*, *Koonthalai*, *Maanaathu monthan*, *Monthan*, *Naattu Ka*, *Naattu monthan*, *Peria bonthan*, *Sahara monthan*, *Ullur monthan*; (Telugu) *Bontha*, *Bontha aratti*, *Koorakayi chettu*, *Nalla bontha*, *Pacha bontha*, *Palakolu bontha*, *Pedda bontha*; (Kanarese) *Kaththi bale*; (Malayalam) *Thezhuthani*; Orissa—*Bantal.*

It is a medium-sized plant grown extensively especially in the central and northern districts of the Madras province. The peduncle is very long and the heavy bunches often look as if they are hanging from the crown of the plant. It takes about 16 months to mature from time of planting to harvest stage. This variety is popular in the central and northern districts just as *Monthan* in the southern districts of the Madras province. There is a large trade in the unripe fruits of this variety to be used for culinary purpose in and around the city of Madras. It is considered even better than *Monthan* for this purpose. Ripe fruits are occasionally consumed



NALLA BONTHA

wherever it is grown extensively. The fruits are almost as large as *Monthan*. *Monthan* is easily distinguished from this by the stout and rounded apex of the fruit while this has no pronounced apex and is almost pointed.

Stem yellowish green with dark brown blotches near the petiole; 10½ to 14 feet high, circumference at base 27 to 30 inches. Leaves oblong, polished, leathery; petiole yellowish green, 22 to 23 inches long, circumference 5 inches; channel of petiole ¼ inch wide, ¾ inch deep; margin of petiole a thin dark line; lamina 6½ to 7 feet long, 27½ inches broad; lamina base right side ½ inch short, very slightly cordate, left side cordate; apex of lamina, right side truncate, left side 55°; number of leaves 45 with an average monthly emergence of 4. Shot blades 2, bottom often erect, sometimes drooping, 38½ inches long (seen outside) lamina portion 26½ inches long 17 inches broad; top (dried) 23 inches long, lamina portion 3½ inches long, ¼ inch broad. Inflorescence, peduncle glabrous, 2½ feet long, 5½ inches in circumference; position of mature bunch pendulous and nearly parallel to the stem. It has female and deciduous male flowers only; fertile axis 1¼ to 1½ feet long, deciduous male portion 2 feet long. Bract outside light red, glaucous, inside red, pitted longitudinally in lines, 22·2 centimetres long, 16 centimetres broad, elliptic oblong; apex broadly obtuse. Flower deciduous male, 7·8 centimetres long, one centimetre broad, 1·2 centimetre deep. Calyx (perigonium) 5·3 centimetres long, 1·2 centimetre broad, calyx outside red with white tinge, inside deep red, cream-coloured on the margins, lobes 5, two small alternating with 3 large ones; the large lobes have each one horn on the outer side, yellowish; keel not prominent. Petals (scale) 3·9 centimetres long, 2·8 centimetres broad, boat-shaped, reddish white outside, inside pinkish white, corrugations two, semi-transparent; apex accuminate, erect or bent inside, long, corrugation one, yellowish. Stamens 5, 5·1 centimetres long, straight; filament 2·6 centimetres long, white with pinkish tinge, some are flat; anther 2·3 centimetres long, bent back, shorter than the style and stigma, whitish; anther valve grey. Pistillode 7·6 centimetres long, style 4·6 centimetres long, erect, tapers to stigma, stigma brown, lobes not distinct, brown. Ovary deciduous, 2·5 centimetres long, greenish white with red blotches, four-sided on the back and rounded, rather slender, pedicel 1¼ inch long, 3 to 4-sided and then terete, 5-ridged, 3 ridges prominent; hands very loose, 4 to 7, fingers very loose, 10 to 14 in a hand, nearly terete with 5 prominent ridges, 7 inches long, 7 inches in circumference, about 50 to 70 in a bunch; fruit tapers to apex; apex one inch long, stout, 5-ridged, tip of apex warty; rind very thick, ripening to yellow, pulp cream-coloured, juicy, soft, insipid : ripe fruits strongly attached to the pedicel.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *nalla bonthana* Jacob.

Cum *Monthan* cognata sed differt absentia solidi rotundique apicis, fructibus ad apicem contrahentibus, apice acuto circa 1 inch longo.

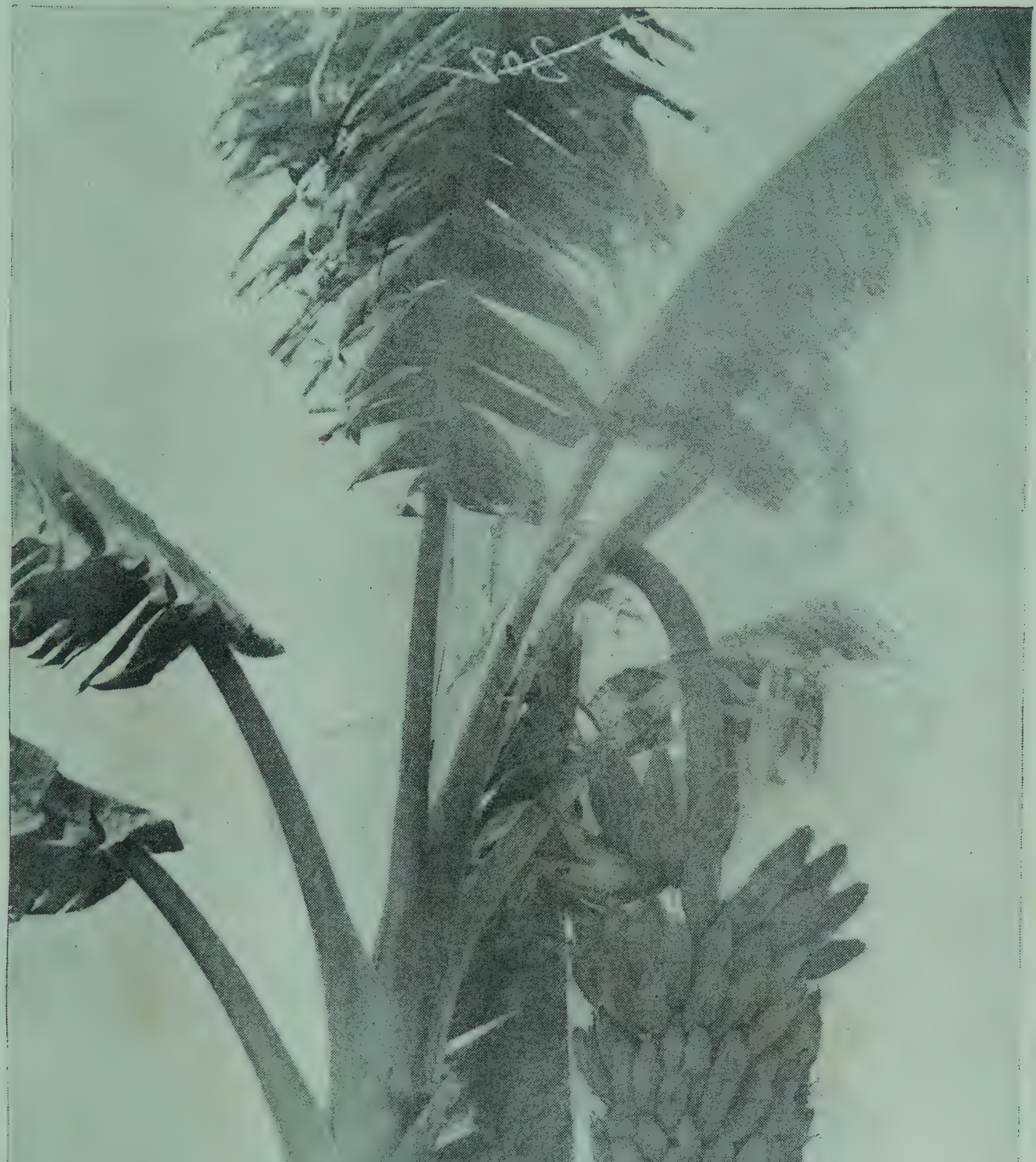
NALLA BONTHA BATHEES

Musa sapidisiaca K. C. Jacob, nom. nov. var. *nallabonthana* Jacob forma *nallabonthabatheesiana* Jacob.

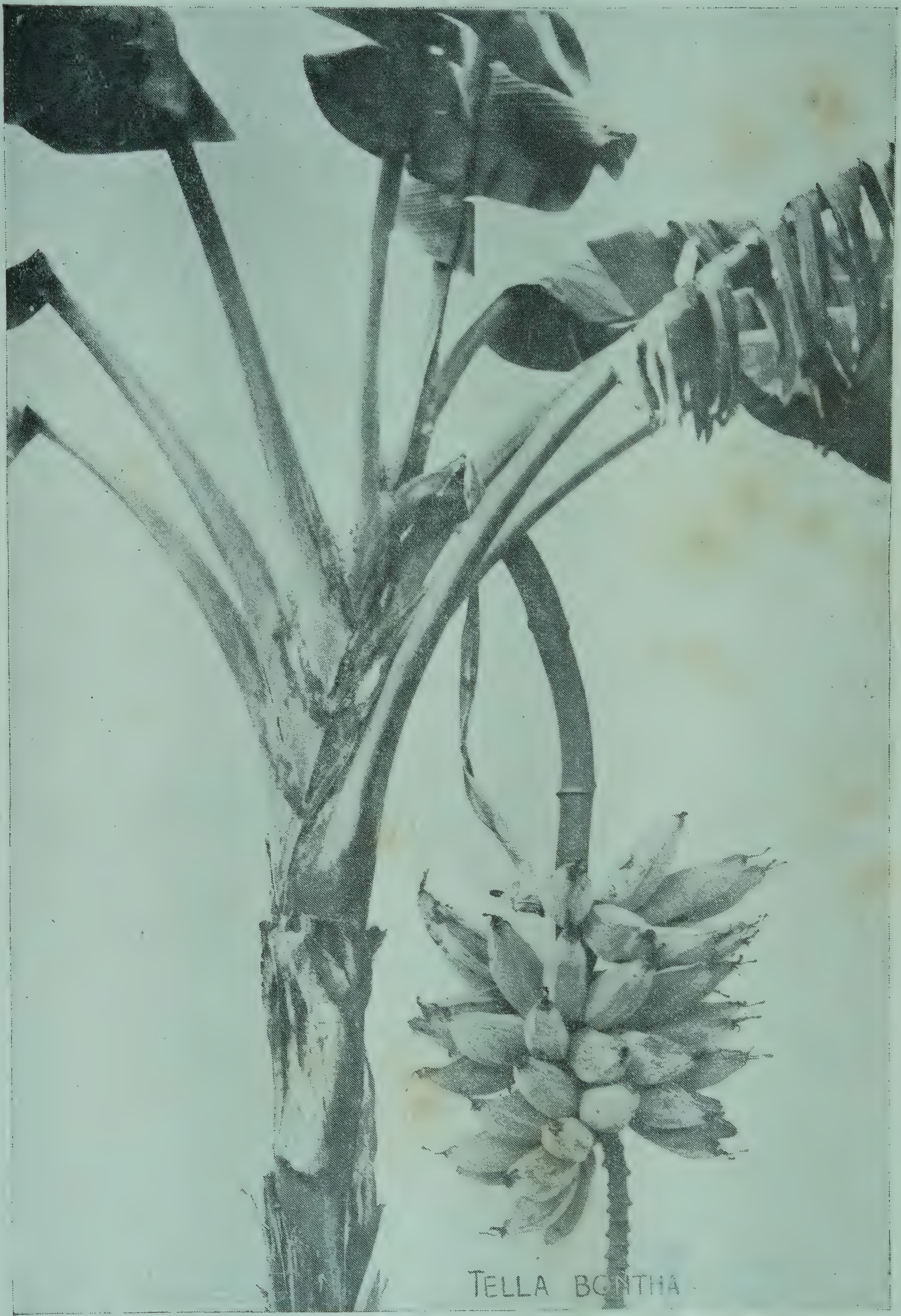
Local names.—Madras (Telugu) *Isika bontha*, *Pichika bontha.*

It is a fairly tall and stout plant found only in the northern districts of the Madras province. It takes about 15½ months to mature from time of planting to harvest stage. It is a sport of *Nalla bontha* but differs from it in having about 15 hands of fruits set on the axis in a congested manner consisting of medium to small fruits arranged in a diminishing manner from base to tip. Unripe fruits are mainly used for culinary purpose ; occasionally the basal fruits are consumed when ripe. When the fruits are intended to be eaten when ripe, the top half of the bunch is cut off soon after the female flowers have opened, leaving alone the basal half, where the fruits are the largest. This is a very rare variety.

Stem yellowish green, 8½ inches high, circumference at base 25 inches. Leaves glaucous below ; petiole 15½ inches long, circumference 4 inches ; channel of petiole 5/8 nch deep, margins touching ; lamina oblong, 6 to 7 feet long, 23 inches broad ; lamina base ½ inch shorter than the left, slightly cordate, left side narrowly auricled, auricle 1¾ inches deep ; apex right side truncate, left side 67½° ; number of leaves 46 with an average monthly emergence of 4. Shot blades 3, bottom erect, 42½ inches long (seen outside), lamina portion 35½ inches long, 19½ inches broad ; second 29 inches long (seen outside), lamina portion 4½ inches long, 2 inches broad, basal enclosed portion green, rest dried ; top deciduous, 19½ inches long, lamina portion 2½ inches long, 1½ inches broad. Inflorescence, peduncle glabrous, 18 inches long ; position of mature bunch pendulous and almost parallel to the stem. It has female and deciduous male flowers only, often with a second or even a third series of female flowers which also develop into fruits ; fertile axis 2 feet long, sterile axis 1¼ foot long, rather stiff. Bract outside light purple, yellow tinge towards base, very glaucous, inside red, margins dark red, shining, 20·5 centimetres long, 14·8 centimetres broad ; apex broadly obtuse. Flower deciduous male, 7·3 centimetres long, 4 centimetres broad, 1·2 centimetre deep. Calyx (perigonium) 5·3 centimetres long, 1·7 centimetres broad ; calyx outside whitish



NALLA BONTHA BATHEES



TELLA BONTHA

with red tinge, yellowish towards apex ; margins hyaline ; inside red, apex yellow, margins hyaline ; lobes 5, 2 small alternating with 3 large, yellow ; keels 2, prominent. Petals pinkish, 2·9 centimetres long, 2·3 centimetres broad, boat-shaped, transparent, semi-transparent towards apex ; ridge one, prominent, protruded inside ; apex acuminate, yellowish, erect, without any ridge. Stamens 5, 4·5 centimetres long, erect ; filament 1·9 centimetres long, pinkish, slightly flat ; anther 2·7 centimetres long, with a slight bent at the junction of anther and filament ; yellowish ; anther valves cream-coloured. Pistillode 7 centimetres long ; style and stigma 5 centimetres long, whitish ; stigma yellowish ; lobes 5, irregular, erect. Ovary deciduous, 2·2 centimetres long, greenish with reddish blotches, terete, tapers to base ; pedical one inch long, 5-unequal sided, 5-ridged, all ridges prominent ; hands compact, 20, fingers compact, up to 12 in a hand, terete with 5 unequal sides, 5-ridged, all ridges prominent ; 6 inches long, 5¾ inches in circumference, but diminishing in size towards the top where the length of fruit is only half of the basal ones ; apex very stout, one inch long, 5-unequal sided, 5-ridged, all ridges very prominent ; base of style persists on the fruits, about 150 to 200 in a bunch ; ripe fruits do not drop off easily from the pedicel ; rind very thick, ripening to yellow ; pulp very soft, dull white in colour, juicy and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *nallabonthana* forma *nallabonthabatheesiana* Jacob.

Sport of *Nallabontha*, sed differt evdem modo quo varietas *Pachamonthabathese* a varietate *Monthan* differt.

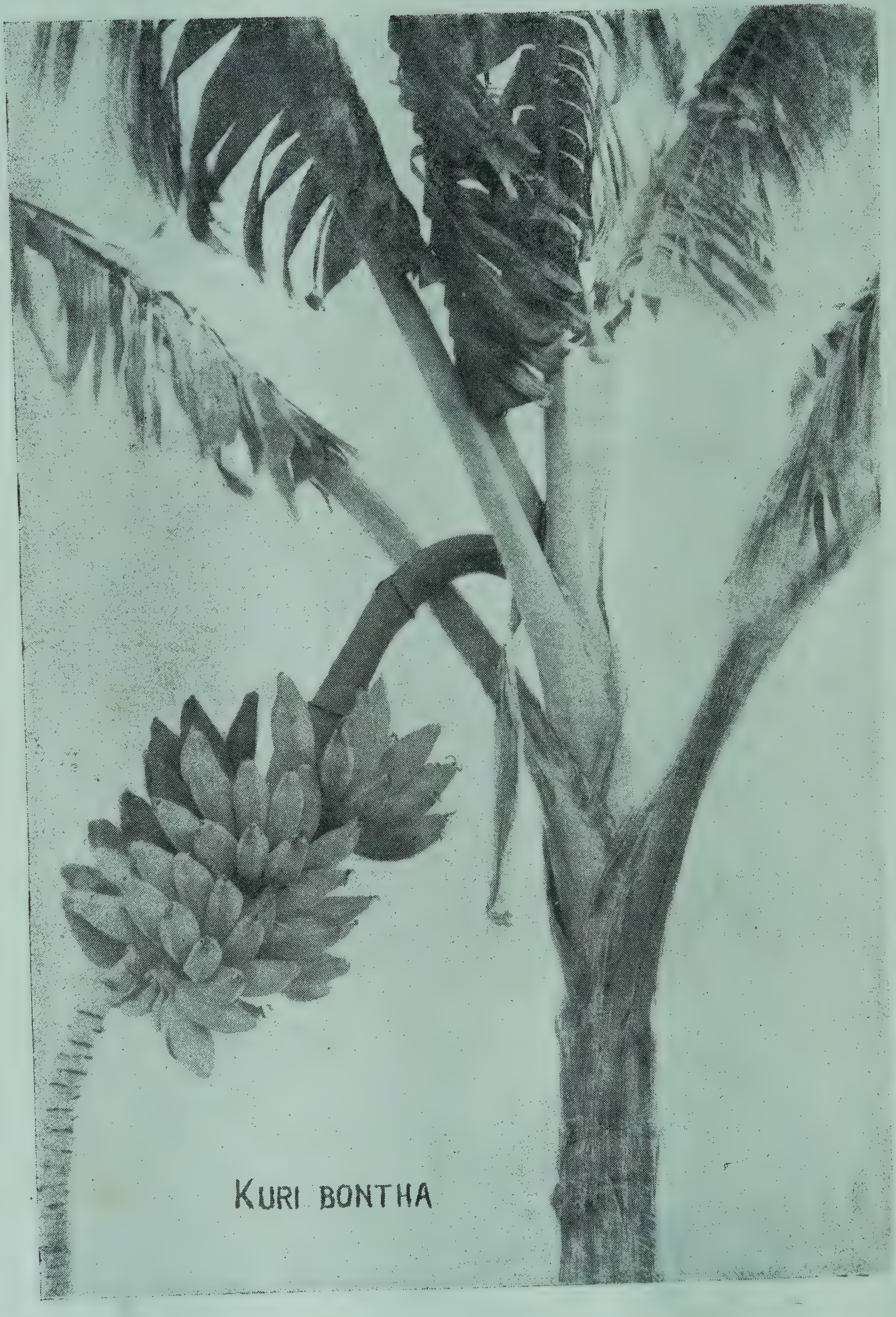
THELLA BONTHA

Musa sapidisiaca K. C. Jacob nom. nov. var. *thella bonthana* Jacob

Local names.—Madras (Tamil) *Sambal bonthan*, *Sambal vazhai* ; (Telugu) *Booditha bontha*, *Thella bontha.*

It is a medium-sized plant found in stray cultivation especially in the northern districts of the Madras province. The bunch of large fruits of this variety with its ashy coating is very conspicuous in any banana plantation. It takes about 16 months to mature from time of planting to harvest stage. It is not grown anywhere as pure stand It differs from *Nalla bontha* in the ashy coat on the fruits. The size, shape and use of fruits are same as *Nalla bontha.* Plants with congested type of bunch with many hands and fruits of medium to small size as are found in the sports *Monthan*, *Sambrani monthan* and *Nalla bontha* have not been noticed in this variety anywhere by the anthor though he believes that this sport—*Thella bontha bathees*—might be in existence in the tracts where *Thella bontha* is grown.

Stem yellowish green with dark brown blotches near the petiole, 11½ feet high, circumference at base 29 inches. Leaves oblong, polished, leathery; petiole yellowish green, 25 inches long, circumference 4½ inches; channel of petiole ⅛ inch wide, ¾ inch deep; margin of petiole a thin brown line; lamina 6¾ feet long, 25½ inches broad; lamina base right side ¼ inch short, cordate; left side slightly auricled, auricles 1½ inches deep; apex of lamina right side truncate, left side ¾ right angle; number of leaves 42 with an average monthly emergence of 4. Shot blades 2, bottom 36 inches long, lamina portion 17 inches long, 13 inches broad; top 22 inches long, lamina portion 3 inches long, 1½ inches broad; distance between the two 10½ inches long. Inflorescence, peduncle glabrous, 29 inches long, 5¾ inches in circumference; position of mature bunch 25° to the stem and then almost parallel to it. It has female and deciduous male flowers only; fertile axis 14 inches long, deciduous portion 2 feet long. Bract outside dark red, slightly glaucous, inside deep red with pits in lines especially near basal half, ovate oblong, 20 centimetres long, 4·2 centimetres broad; apex rounded, yellowish. Flower deciduous male, 7·5 centimetres long, ·4 centimetre broad, 1·1 centimetre deep. Calyx (perigonium) 5·2 centimetres long, 1·2 centimetre broad; margin hyaline, cream-coloured, calyx outside reddish and cream-coloured; inside dark pink; lobes 5, 2 very minute alternating with 3 large ones, yellow; keels 2; rather prominent. Petals (scale) 3·5 centimetres long, 2·5 centimetres broad, narrowly boat-shaped, margins neither touching nor wide open, pinkish white, ridges 3, one very prominent and the rest not prominent; apex long, acuminate, erect and yellowish. Stamens 5, 5 centimetres long; filament 2·7 centimetres long, white, flat; anther 2·4 centimetres long, cream-coloured; anther valves greyish; pollen present. Pistillode 5·2 centimetres long; style 4·5 centimetres long, white, stiff, erect; stigma brown; lobes 5, indistinct. Ovary deciduous, 2·5 centimetres long, reddish white, nearly terete, ridges not prominent, tapers towards base. Male flowers open in the evening and drop off in the morning. Wrist up to ¾ inch broad in the basal hands; pedicel 1½ inches long, 5-unequal sided, 5-ridged, 3 ridges prominent; hands very loose, 4 to 6, fingers very loose, 10 to 12 in a hand, nearly terete, 5-ridged, 3 ridges prominent; 7 inches long, 7½ inches in circumference, about 45 to 60 in a bunch; fruit tapers to apex; apex not distinct, 5-unequal sided, 5-ridged 3 ridges prominent; style persists in some fruits; colour of green fruit very glaucous, ripening to dull yellow; rind thick; pulp, cream-coloured, juicy, very soft and insipid; fruits strongly attached to the pedicel.


KURI BONTHA

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *thellabonthana* Jacob.

Cum Nalla bontha cognata, sed differt cinereo tegumento fructuum.

KURI BONTHA

Musa sapidisiaca, K. C. Jacob, var. *kuribonthana* Jacob.

Local names.—Madras (Tamil) *Pidi bontha, Katha bonthan*; (Telugu) *Kuri bontha.*

It is a medium-sized plant found in stray cultivation at Cheyyur, Chingleput district; Musanur, Nellore district and Pallur, North Arcot district. Though this variety belongs to the *Monthan* group, the bunch, owing to the small size of the fruits and their compactness, looks like any of the table bananas. It takes about 15 months to mature from time of planting to harvest stage. It is not grown as pure stand anywhere in this province. The unripe fruits are used mainly for culinary purpose; ripe fruits are also occasionally consumed in places where it is grown.

Stem light green, 8 feet high, circumference at base 24 inches. Lamina linear oblong, glaucous below; petiole greenish yellow, 14 inches long, circumference 4 inches; margin of petiole with a dark line and touching; channel of petiole ½ inch deep; lamina 5¾ feet long, 22½ inches broad; lamina base ¼ inch shorter than left, truncate; left side narrowly auricled, auricle ¾ inch deep; apex of lamina right side truncate, left side ¾ right angle. Shot blades 2, bottom 30 inches long (seen outside the pseudostem), lamina portion 22 inches long, 14½ inches broad; top (dried) 22 inches long, lamina portion 3½ inches long, one inch broad. Inflorescence, peduncle glabrous, slender, 26 inches long, 5 inches in circumference; position of mature bunch ½ right angle to the stem; it has female and deciduous male flowers only; fertile axis one to 1¼ foot long, sterile axis 2 to 2½ feet long, drooping. Bract outside light purple, yellow tinge towards base, very glaucous, inside red, margins dark red; 20 centimetres long, 14·6 centimetres broad; apex rounded with a notch. Flower deciduous male, 6·4 centimetres long, ·5 centimetre broad, ·8 centimetre deep. Calyx (perigonium) 4·9 centimetres long, 1·5 centimetres broad, calyx outside whitish with red tinge, yellowish towards apex, margins hyaline; inside red, apex yellow, margins hyaline; lobes 5, 2 inside ones slightly smaller than 3 larger outer ones; yellow; keels 2, slightly prominent. Petals (scale) pinkish, 2·9 centimetres long, 2·2 centimetres broad, boat-shaped, semi-transparent and transparent towards apex; ridges 3, prominent; apex acute, yellowish, slightly bent, without any ridge. Stamens 5, 4·5 centimetres long, erect;

filament 2·1 centimetres long, whitish with reddish tinge towards apex, flat ; anther 2·5 centimetres long, rather short, cream-coloured ; anther valves brown. Pistillode 6·3 centimetres long ; style 4·6 centimetres long, whitish ; stigma yellowish, lobes 5, erect. Ovary deciduous, 1·9 centimetres long, yellowish green with red blotches, nearly terete, slightly tapers to base ; pedicel 7/8 inch long, unequally 5-sided, 5-ridged, 3 ridges prominent, hands rather loose, 5 to 8 ; fingers rather loose, up to 11 in a hand, rather flat with 5 unequal sides, 5-ridged, all ridges prominent, 4⅝ inches long, 5 inches in circumference ; apex stout, ⅝ inch long, 5-unequally sided, 5-ridged, all ridges prominent ; about 60 fruits in a bunch : ripe fruits are strongly attached to the pedicel ; rind rather thick, ripening to yellow, pulp cream-coloured, juicy and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *kuribonthana* Jacob. Quamvis cum varietate *Monthan* associetur, differt parvis fructibus compressisque manipulis.

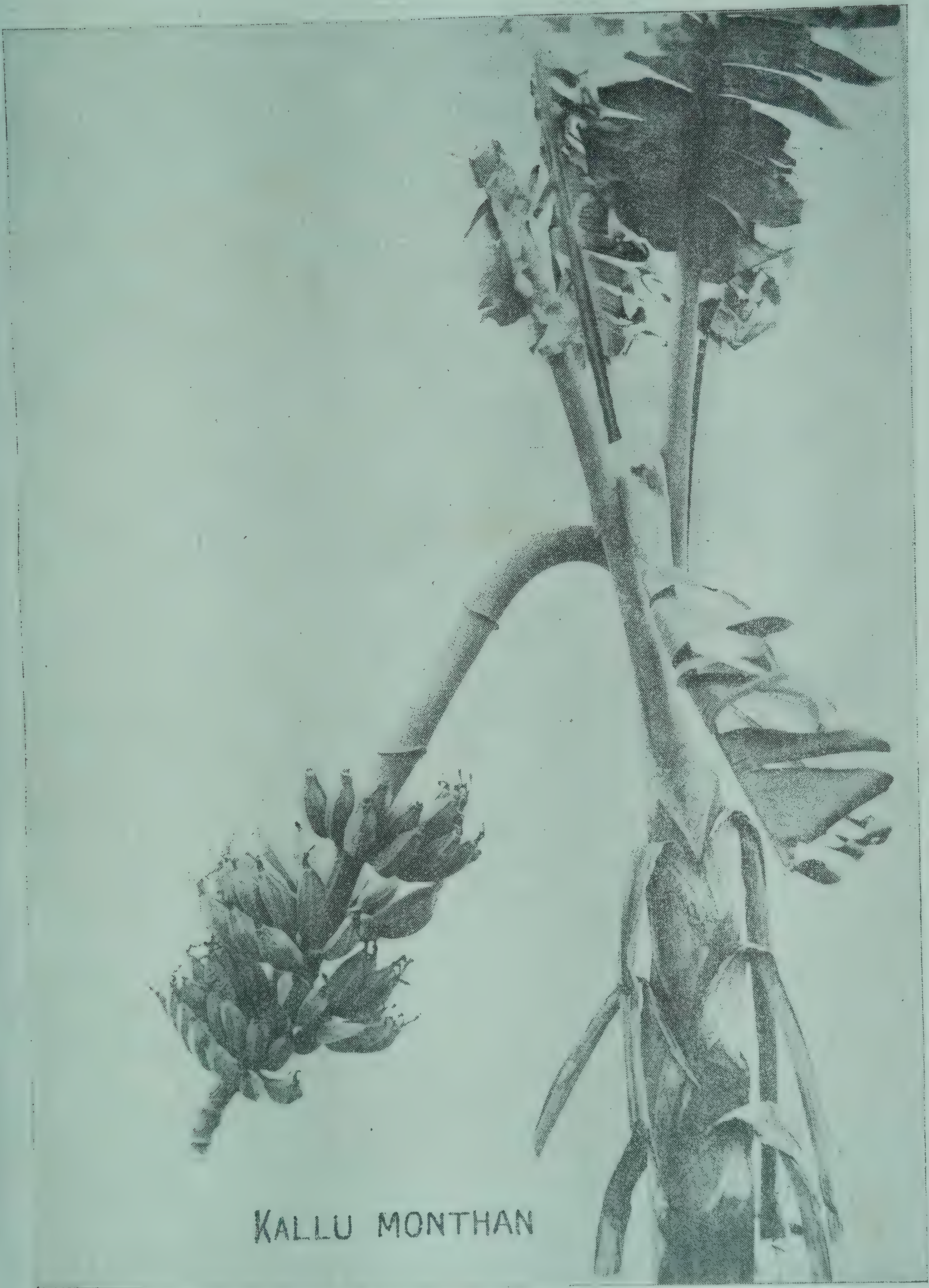
KALLU MONTHAN

Musa sapidisiaca, K. C. Jacob, nom. nov. var. *kallumonthaniana* Jacob.

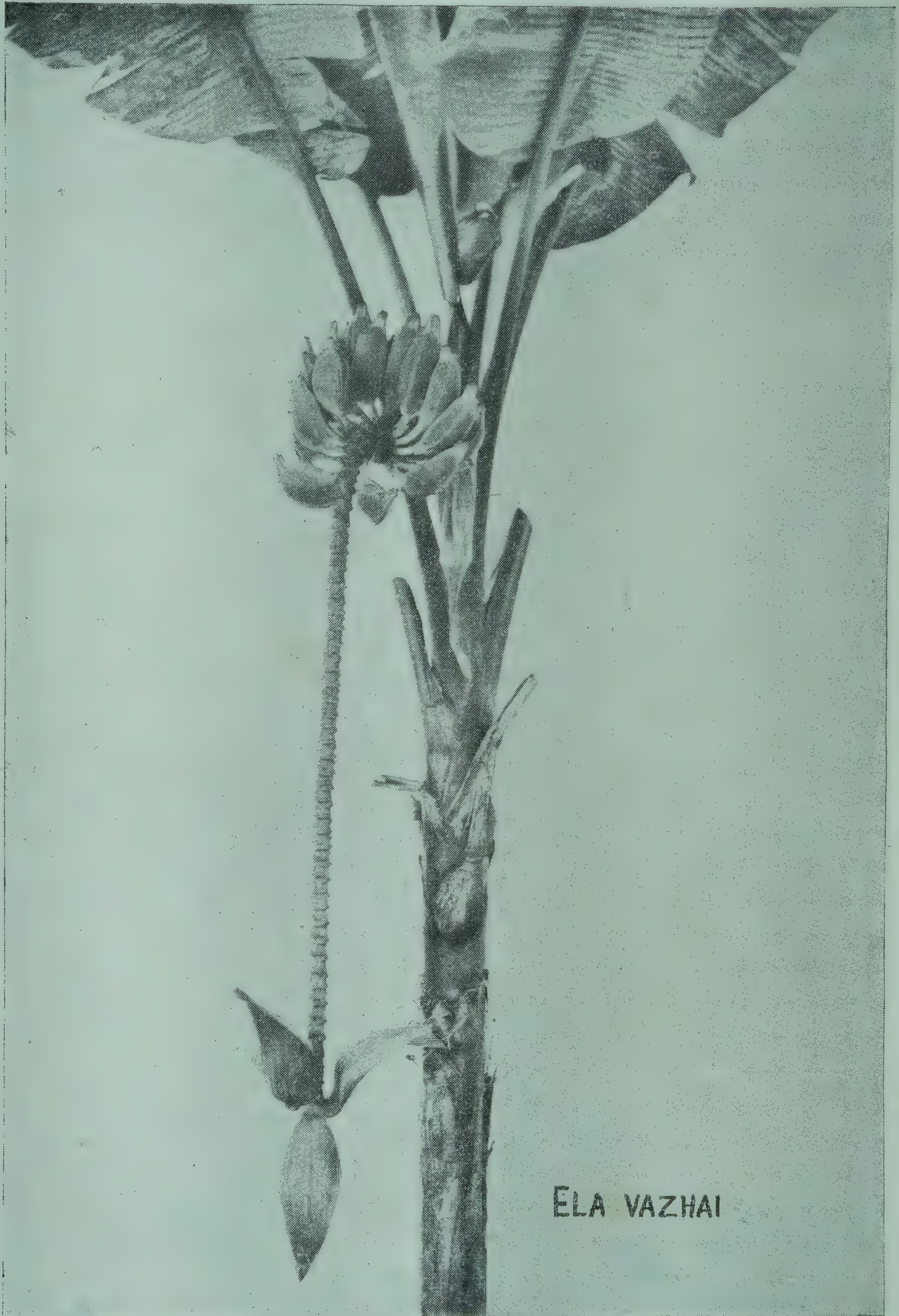
Local names.—Madras (Tamil) *Kallu monthan, Pidi monthan.*

It is a tall and fairly stout plant found only at Kulittalai in the Tiruchirappalli district. This variety has the smallest fruits in the *Monthan* group, but has the largest 'heart' among all the varieties of bananas. Even at the time of harvest, the size of the heart is not appreciably diminished. At this stage, the heart nearly touches the ground. It takes about 17½ months to mature from time of planting to harvest stage. This variety is exclusively grown for the unripe fruits to be used for culinary purpose. The cultivation of this variety is declining on account of the small size of bunches and fruits. Because the plant food is used up in the development of the 'heart', the fruits do not grow large. It is, therefore, quite necessary to remove the 'heart' in this as well as in all other varieties soon after the fruit-bearing flowers have opened.

Stem yellowish green, 9½ feet high, circumference at base 25 inches. Leaves oblong, slightly glaucous below ; petiole 17 inches long, 4 inches in circumference ; channel of petiole ¾ inch deep, margins touching ; lamina 6½ to 7½ feet long, 2 feet broad ; lamina base subequal, right side nearly truncate, left side slightly auricled ; auricles 1½ inches deep ; apex of leaf, right side truncate, left side 77° ; number of leaves 38 with an average monthly emergence of 4. Shot blades 3, bottom long or short, erect, one to 4 feet long, basal portion within the pseudostem ; second deciduous, 25½ inches long, lamina portion 3 inches long, 1¾ inches broad ; top deciduous.



KALLU MONTHAN


ELA VAZHAI

Inflorescence, peduncle, glabrous, 22 inches long; position of mature bunch 40° to the stem; it has female and deciduous male flowers only; fertile axis 14 to 15 inches long, deciduous male portion 4 to 4½ feet long. Bract outside light red, very glaucous, inside red, pitted longitudinally in lines, 29 centimetres long, 20·5 centimetres broad; apex broadly obtuse. Flower deciduous male, 9·2 centimetres long, 1·1 centimetre broad, 1·3 centimetre deep. Calyx (perigonium) 5·5 centimetres long, 1·3 centimetre broad, outside pinkish with dirty white streaks; inside pink and yellowish near the apex; lobes 5, 2 small alternate with 3 large, 2 end lobes are awl-shaped, yellow; keels 2, not prominent. Petals (scale) 3·5 centimetres long, 3·5 centimetres broad, boat-shaped, light pink, scaly on the margin, without ridges; apex acuminate, bent inside, ridges 3. Stamens 5, 5·2 centimetres long, straight; filament 2·8 centimetres long, white with pinkish tinge; flat; anther 2·4 centimetres long, bent back, shorter than stigma, whitish; anther valves grey. Pistillode 8·3 centimetres long, style 5·5 centimetres long, white; stigma yellowish brown, lobes not distinct. Ovary deciduous, 3·5 centimetres long, greenish white with red blotches, 4-sided on the back and the rest terete, tapers to base. Pedicel 1¼ inches long, slender, 5-unequal sided, 5-ridged, 2 ridges prominent; hands loose, 5 to 6; fingers loose, 12 in a hand, terete with 5 unequal sides, 5-ridged, 2 ridges prominent, 4½ inches long, 4¾ inches in circumference; apex rather stout, ¾ inch long, 5-sided, 5-ridged, all ridges prominent; base of style persists; about 50 in a bunch; ripe fruits very persistent; rind thick, ripening to yellow; pulp very soft, dull white, juicy and insipid.

LATIN.—*Musa sapidisiaca* K. C. Jacob nom. nov. var. *kallumonthaniana* Jacob.

Haec varietas in *Monthan* associatione parvissimos fructus possidet maximum que cor (" heart ") omnium banana varietatum. Etiam tempore fructuum pendulum cor est circa ¾ pede longum et fere tangit humum etsi planta sit alta.

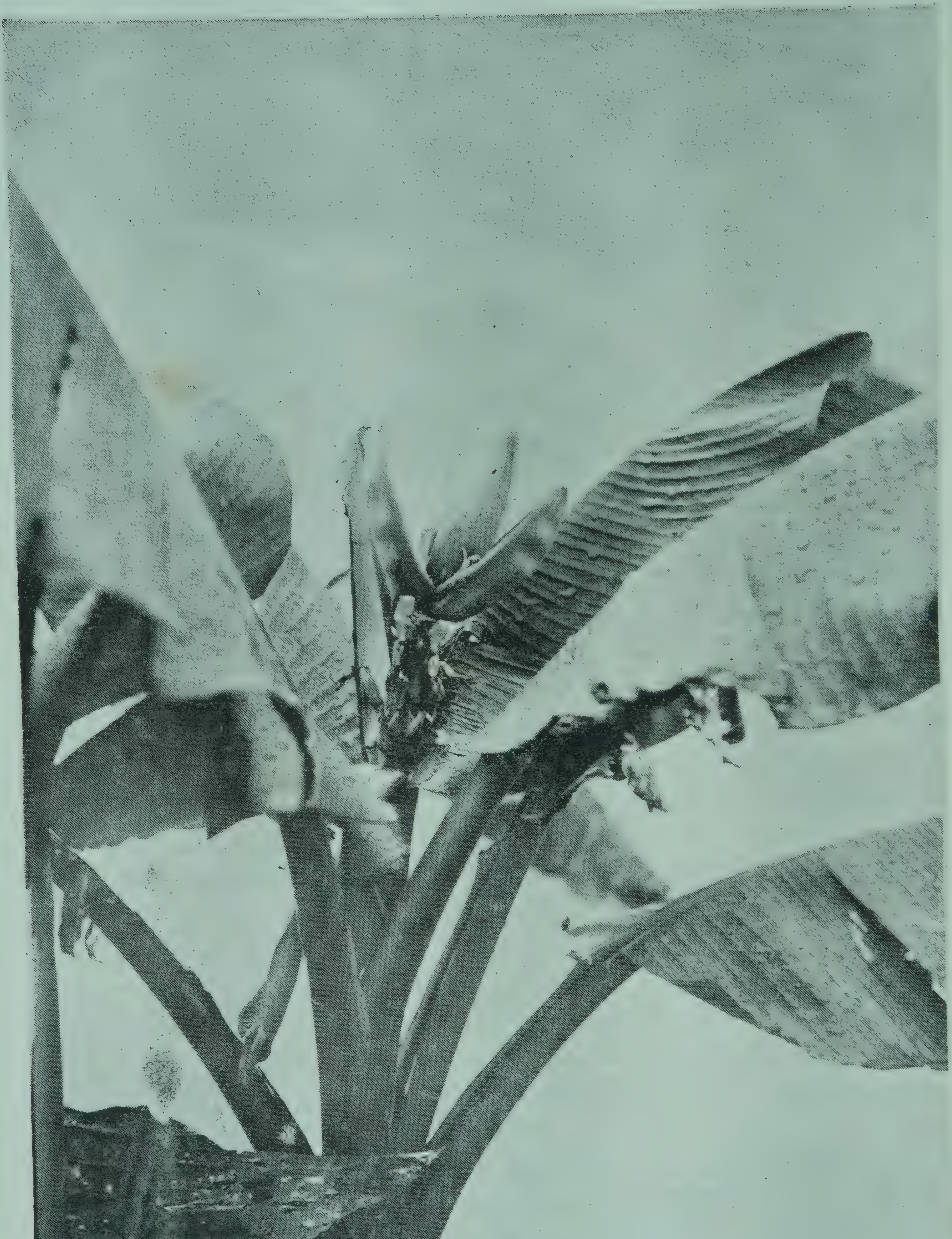
ELA VAZHAI

Musa balbisiana Colla.

Local names.—Madras (Tamil) *Ela vazhai*, *Kotta vazhai* (Kancheepuram, Chingleput district); (Telugu) *Aakku arati*, *Ginja arati*, *Verri arati*; (Kanarese) *Ela bale*, *Kallu bale*: Assam *Athiya kol.*

It is a tall plant with medium thickness. It is cultivated to a small extent at Tirupathi in the Chittoor district. It produces more leaves than the other varieties of bananas, the average monthly emergence being 4 to 5. Three to four open bracts of bright pink colour hold on to the axis for a few days unlike in other varieties, which add to the pretty appearance of the plant. It is grown for its leaves to be used as plates. Stray plants are also grown in the backyards of some houses in the southern districts for the same purpose. It has not been noticed growing wild anywhere in this province. The fruits are not edible on account of the large number of hard seeds in the pulp. Monkeys and birds, however, eat the scanty pulp. The seeds are viable and seedlings have been seen growing from self-sown seeds in the banana experimental area at Coimbatore. The fibre from the leaf sheaths is very strong with good lustre.

Stem green, 15 feet high, circumference at base 24 inches ; leaf linear oblong, slightly glaucous below, shining above ; petiole green, 20 inches long, circumference 2¾ inches, margin of petiole scarious, one overlapping the other ; channel of petiole ½ inch deep ; lamina linear oblong, 5⅓ feet long, 18¼ inches broad ; lamina base right side ½ to one inch longer than left, cordate ; left side cordate ; apex of lamina right side truncate, left side 80° ; midrib very slender, polished ; shot blades 3, bottom green, attached far inside leaf-sheath, bent, 17 inches long, lamina portion one foot long, 10 inches broad ; second dry, 18 inches long, lamina portion 4 inches long, 1½ inches broad ; third dry, 14 inches long, lamina portion not distinct. Inflorescence, peduncle glabrous, slender, 8 inches long ; position of mature bunch 85° to the stem. It has female and deciduous male flowers only, fertile axis 5½ inches to one foot long, sterile axis 2½ feet long, pendulous and parallel to the stem. Bract 3 or 4, open bracts remain on the axis even after the deciduous male flowers have dropped ; outside dull pink and slightly glaucous ; inside bright pink and pitted longitudinally towards middle, 23·8 centimetres long, 15 centimetres broad, apex broadly rounded ; margin towards apex, bent inside. Flower deciduous male, 7·7 centimetres long, ·8 centimetre broad, 1·1 centimetre deep. Calyx (perigonium) 4·5 centimetres long, 1·1 centimetre broad, outside reddish white, inside whitish red ; margin hyaline, cream-coloured, lobes 5, 2 minute alternating with 3 fairly large ones, 2 end lobes have upright awl-shaped awns ; yellow ; keels 2, not prominent. Petals (scale) 3·3 centimetres long, 1·8 centimetres broad, boat-shaped, transparent, white, one or two depressions towards apex ; apex small, acute, whitish, erect or bent. Stamens 5, 5·3 centimetres long, erect, overtopping stigma, partially rolled back ; filament 2·7 centimetres long, white, slightly flat ; anthers 2·5 centimetres long, white ; anther valves brownish, pollen profuse. Pistillode 7·1 centimetres long, style 4·3 centimetres long, white ; stigma


KAATTU VAZHA

brownish; lobes 5, indistinct. Ovary deciduous, 2·8 centimetres long, whitish with red blotches, 5-unequal sided and rather slender; wrist ½ inch broad; pedicel 1·2 inch long, unequally 5-sided, 5-ridged, all ridges prominent; hands not compact, 5 to 7; fingers not compact, 8 in a hand; 4·5 inches long, 4·5 to 5 inches in circumference; apex ¾ inch long, 4 to 5-ridged, all ridges prominent; perianth, stamen and style marcescent; fruit tapers to apex, about 50 in a bunch; ripe fruits do not drop off easily from the pedicel; rind medium thick, ripening to yellow; pulp cream-coloured, full of viable seeds; seeds broader than long, dark, tubercled, 6 millimetres broad and 4 millimetres long.

KATTU VAZHA

Musa kattuvazhana, K. C. Jacob, sp. nov. Musaceae.

Local names.—Madras (Malayalam) *Kaattu vazha*, *Kattu vazhai* (Anamalai hills, Coimbatore district).

It is a medium-sized plant with medium stoutness. It is the only seeded banana growing wild in the Madras province, while the other species are found cultivated. It thrives in the moist evergreen forests of the Western ghats. Attempts for its introduction into Coimbatore were unsuccessful but once two such plants produced erect inflorescences which, however, did not produce any fruits. The photo opposite demonstrates it. The leaves are used as plates by people living in the neighbourhood. The fruits being full of hard seeds, with little pulp, are not edible; they are, however, eaten by monkeys and birds. The seeds germinate in their natural habitat and seedlings are seen in large numbers near their mother plants.

Stem dark brown with reddish tinge and yellowish green with purplish blotches near the bases of leaves, 8 feet high, circumference at base 17 inches. Leaf oblong, both surfaces shining, leathery, yellowish green; petiole yellowish green, 13½ inches long, circumference 6 inches; channel of petiole 1½ inches wide, one inch deep; margin of petiole, a dark purple line, left side slightly winged to ¼ inch broad; lamina 7¼ feet long, 28½ inches broad; lamina base right side 2 inches short, cordate, left side acuminate; apex of lamina right side truncate, left side short by ¾ inch and 85°. Inflorescence, peduncle very slightly pubescent, 9 inches long; position of mature bunch nearly right angle to the stem. It has female and deciduous male flowers only; fertile axis one foot long, deciduous portion 2 feet long. Bract outside purple, inside dark red, shining, 12 centimetres long, 6½ centimetres broad, apex broadly obtuse. Flower deciduous male, 4·4 centimetres long, 4 centimetres broad, ·3 centimetre deep. Calyx (perigonium) 3·3 centimetrss long, 1·2 centimetre broad, calyx outside purplish, inside light purple ; lobes 5, 3 large outer alternating with 2 small inside ones, yellowish ; keels 2, prominent. Petals pinkish, 1·5 centimetres long, ·8 centimetre broad, nearly transparent, ridges 2, not prominent, far below the apex ; apex acute, pinkish, erect, without ridges. Stamens 5, 3·1 centimetres long, erect; filament 1·1 centimetre long, whitish, flat, one or two with one or two grooves ; anther 2 centimetres long, straight and bent towards apex ; anther valves pinkish ; pollen profuse. Pistillode 3·7 centimetres long, style and stigma 2·7 centimetres long ; whitish, stigma brownish, slender ; lobes distinct, erect. Ovary deciduous, one centimetre long, purplish, unequally 5-sided, tapering towards base. Pedicel short ; hands compact, 6 to 7 ; fingers compact, 18 in a hand, 5-unequal sided, 5-ridged, 2 prominent, 4·5 inches long, 3·6 inches in circumference ; apex ½ inch long, 5-unequal sided, 5-ridged, 2 ridges very prominent, fruit tapers to apex ; apex bent, about 100 in a bunch ; ripe fruits do not drop off easily from the pedicel ; rind thick, ripening to purplish yellow and getting dark ; pulp cream-coloured, full of hard viable seeds, seeds angular, dark in colour, broader than long, 7 millimetres broad, and 4 millimetres long.

Musa kattuvazhana, K. C. Jacob, sp. Nov. Musaceae

Truncus herbaceus, fuscus, pigmentis subrubris, 8 to 12 pedes altus. Ab aliis speciebus oliffert sequentibus signis ; foliis flavo-viridibus, utrimqne nitentibus ; petiolo flavo-viridi 13½ inches longo ; petioli ora sinistro latere alata, ala ¼ inch lata ; petioli canali late aperto ; laminiae basi dextro latere 2 inches breviori, cordata, sinistro latere acuminata ; laminae apice latere sinistro ¾ inch breviori quam latere dextro, 85° ad venam principalem ; pedunculo leviter pubescenti, 9 inches longo ; maturis racemis fere recto angulo a trunco prodeuntibus ; antheris plenis fertilibus pollinis granis ; fructibus condensis, 4·5 inches longis, 5 lateribus inaequalibus, purpureo flavo colore ; pulpa exigua ; seminibus numerosis, viabilibus, duris, angulosis, nigris, magis latis quam longis, 7 millimetres latis, 4 millimetres longis.

Type locality.—Suryampat, Kalpatta, N. Malabar. Type in Madras Herbarium, Coimbatore ; Madras Herbarium No. 88134.

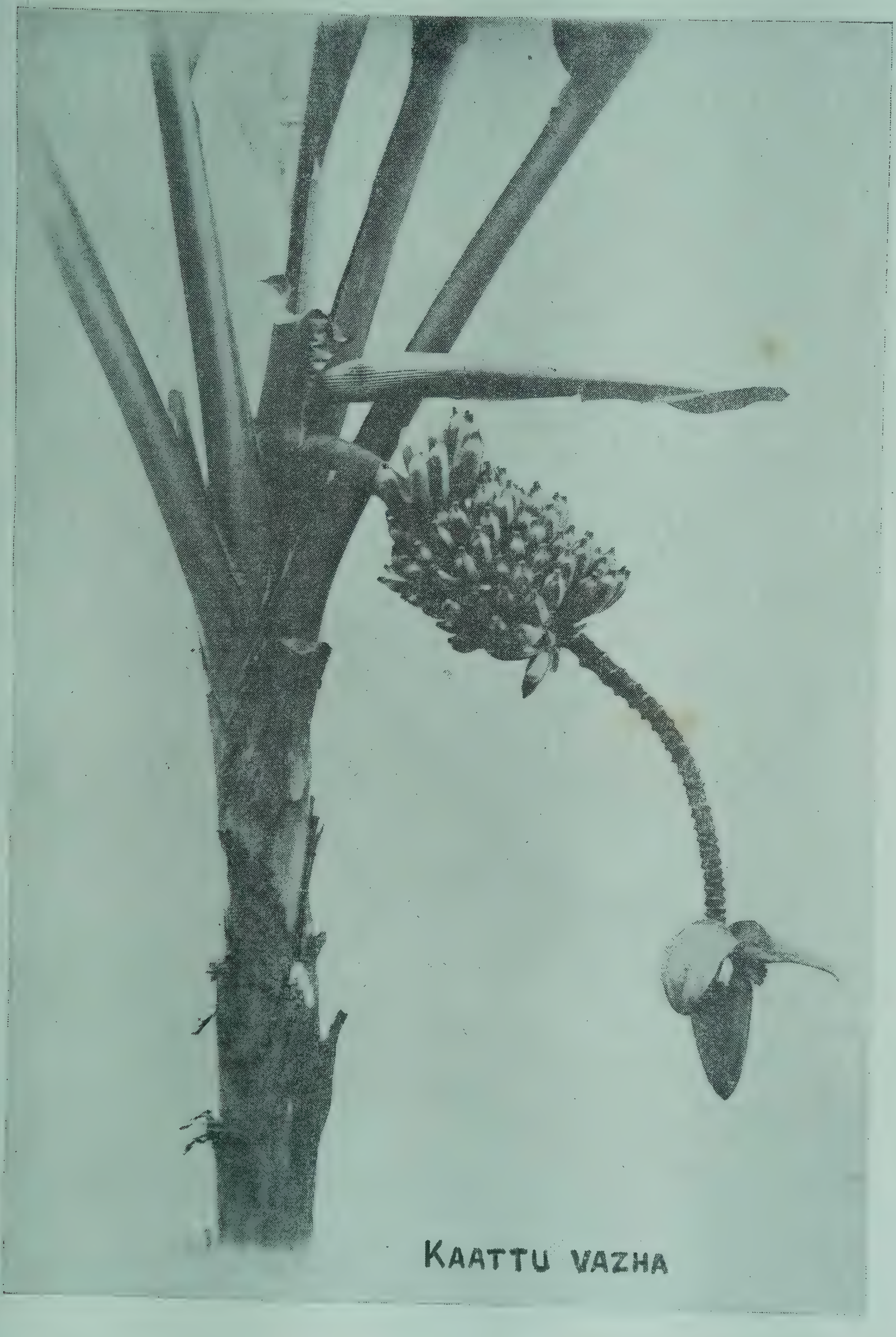
Collected by K. Cherian Jacob

Local names.—(Malayalam) *Kattu vazha* ; (Tamil) *Kallu vazhai*

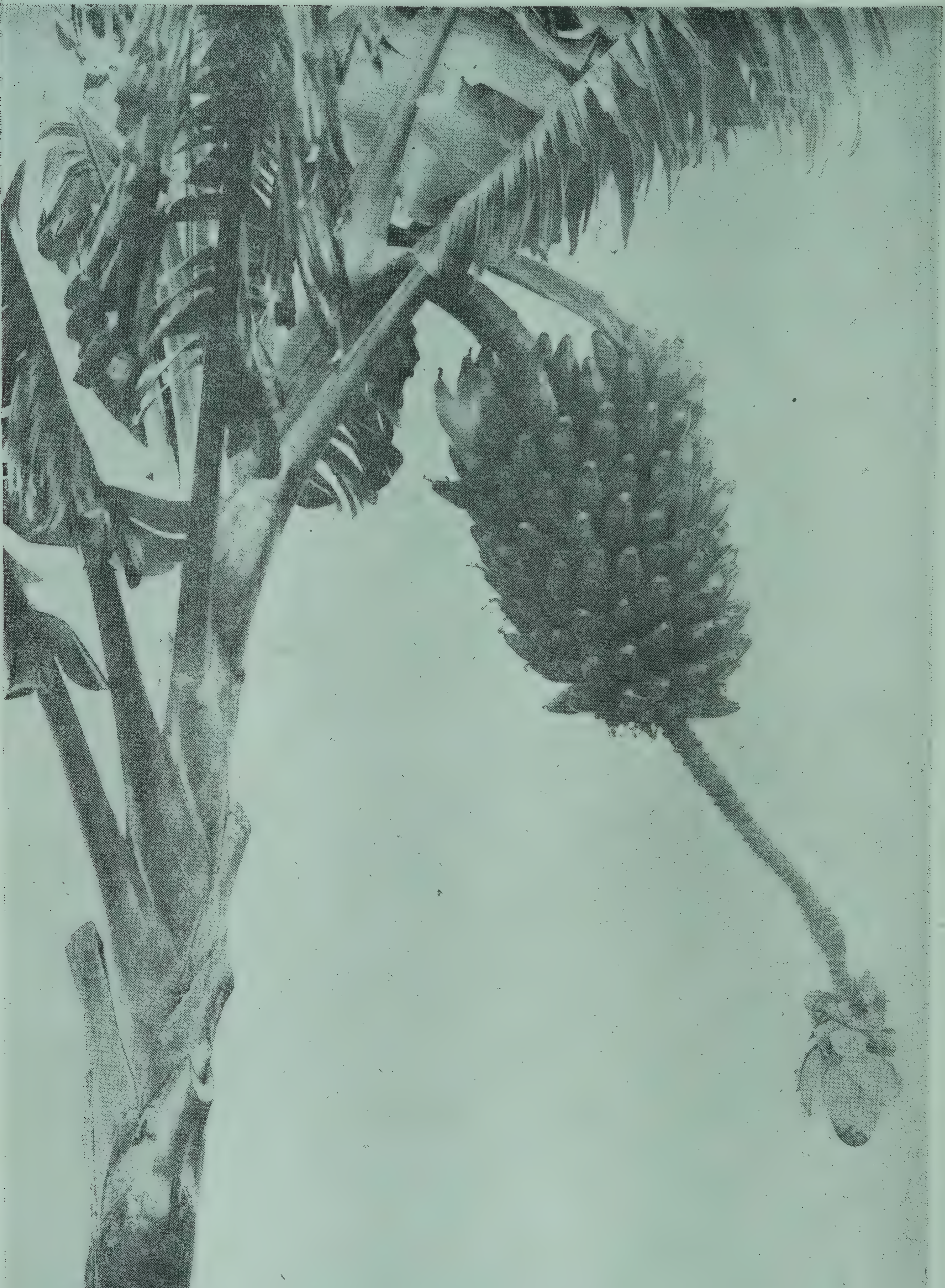
NAARU VAZHA

Musa textilis Nee.

Local names.—Madras (Tamil) *Kallu vazhai* (Burliar, Nilgiris) ; (Kanarese) *Natal bale* ; (Malayalam) *Naaru vazhai* ; (English) Manila Hemp.



KAATTU VAZHA



MUSA TEXTILIS NEE

It is a very tall and stout plant. The author has seen only one or two clumps at Trichur Government Farm, Cochin State, and a few clumps at the Government Pomological Gardens, Burliar, Nilgiris. This has been introduced into this country from Manila, Philippine Islands.

Stem green, exposed portion light green, dark green on the other side, 13 feet 8 inches high, circumference at base 24½ inches. Leaf broadly oblong, leathery, polished above and very glaucous below; petiole green, glaucous, 16 inches long, circumference 5 inches, channel of petiole ¾ inch deep, margin of petiole touching; lamina 6 feet 5 inches long, 27 inches broad; lamina base, right side one to 1½ inches shorter than the left, deeply cordate, left side auricled; apex of lamina right side truncate, left side 80°; midrib prominent, brownish green. Shot blades 2, bottom, green (attached far inside leaf-sheath), bent, 2 feet 2 inches long, lamina portion 10 inches long, 7 inches broad; second dry, 22 inches long, lamina portion 2 inches long, one inch broad. Inflorescence, peduncle glabrous, one foot long, position of mature bunch 50° to the stem. It has female and deciduous male flowers only; fertile axis 13 inches long, deciduous portion 1¼ feet long. The heart is very large in this species; 6 to 8 bracts, some dried up, remain always just below the heart; Bract: 3 or 4 open bracts remain on the axis even after the male flowers have dropped; outside dark pink, very glaucous, inside dark red, 19·5 centimetres long, 19·5 centimetres broad; apex rounded. Flowers deciduous male, 7·5 centimetres long, ·6 centimetre broad, one centimetre long; perigonium outside light pink, inside pink; margin hyaline, whitish; lobes 5, 2 small alternating with 3 large; deep yellow; keels 2, not prominent. Petals (scale) 3 centimetres long, 2·2 centimetres broad, boat-shaped, nearly transparent, white with pinkish tinge; ridges one to two, not prominent, apex 3 millimetres long, yellowish, nearly erect. Stamens 5, 6 centimetres long, erect with apex bent, much overtopping the stigma; filament 2·5 centimetres long, white, flat, straight at the junction; anther 3·2 centimetres long, cream-coloured, anther valves pinkish; pollen profuse. Pistillode 6·5 centimetres long, style and stigma 4·5 centimetres long, whitish, stigma brownish, rather stout with 3 or 4 indistinct lobes. Ovary deciduous, 2 centimetres long, yellowish with red blotch towards base, nearly terete with one flat side; ridges not prominent. Wrist ¼ inch broad, pedicel 3·5 centimetres long, 5-unequal sided, 5-ridged, 2 ridges prominent, hands compact, 8; fingers compact, 14 in a hand, nearly terete, 5-ridged, 2 ridges prominent; 6·5 inches long, 6 inches in circumference; apex ⅝ inch long, 5-unequal sided, 5-ridged, 2 ridges very prominent, the perianth and style marcescent, fruit tapers to apex, about 110 in a bunch ; ripe fruits do not drop off from the pedicel ; rind thick, ripening to yellow ; pulp cream-coloured, full of seeds of the size and shape of pepper, and brownish in colour. The fibre of this strain is not as strong as that of some of the local edible banana varieties like *Nendrapadaththi*, *Pacha naadan*, *Vannan* and other varieties.

In the absence of other plants of this species in flower in the neighbourhood, at any stage of development, the flowers of this do not set. It shows that it is selfsterile and also not parthanocarpic. The photo opposite demonstrates this.

The descriptions of the banana varieties given above indicate the existence of innumerable differences in parts, which justify the separate classification of many of them.

Hereunder the instances of the main variations are specified :—

The height of stem varies from $3\frac{1}{2}$ feet in *Vanamakeli* to 21 feet in *Pey ladan* : the stoutness of stem, from 6 inches in diameter at base in *Sanna chengadali* to $1\frac{1}{4}$ feet in *Pey ladan* : the length of leaves, from $3\frac{1}{2}$ feet in *Vamanakeli* to $9\frac{1}{2}$ feet in *Chenkadali*: the width of leaves, from $1\frac{1}{4}$ feet in *Kunnan* to 3 feet in *Chenkadali*: the position of leaves, from nearly erect in *Kunnan* to spreading horizontally in *Monthan* group : the colour of leaf blade, from yellowish green and shining in *Surya kadali* to deep green and glaucous in *Naaru vazhai* : the length of petiole, from 6 inches in *Vamanakeli* to $2\frac{1}{2}$ feet in *Nalla bontha* : the margins of petiole, from overlapping in *Pay kunnan* to wide open in *Kaali* group*: the base of leaf blade, from very pointed in *Namarai* to deeply auricled in *Ney Mannan**: the length of stalk of bunch (peduncle), from 6 inches in *Nalla chakkarakeli* to $2\frac{1}{2}$ feet in *Monthan* group : the thickness of peduncle, from $1\frac{1}{4}$ inches in *Kadali* to $2\frac{1}{2}$ inches in *Kapur* : the peduncle, from smooth in *Thella bontha* to very hairy in *Eththa chingan* : the male flowers, from persistent in *Nendra padathi* to deciduous in *Kaali* of the same group : the length of pedicel (the stalk of fruit), from almost nil in *Kari vazhai* to $1\frac{1}{2}$ inches in *Monthan* group : the size of bunch, from one 'hand' of 6 to 7 fruits in *Moongil* to about 25 hands of nearly 500 fruits in *Ayiranka rasthali* ; the weight of bunch, from 4 lb. in *Surya kadali* to about 60 lb. in *Ayiranka rasthali* : the length of fruits, from 2 inches in *Adakka kunnan* to $1\frac{1}{4}$ foot in *Moongil* : the rind, from papery thinness in *Kadali* to $\frac{1}{6}$ inch in *Pacha naadan* : the colour of pulp of ripe fruit, from pure white in *Thatilla kunnan* to reddish brown

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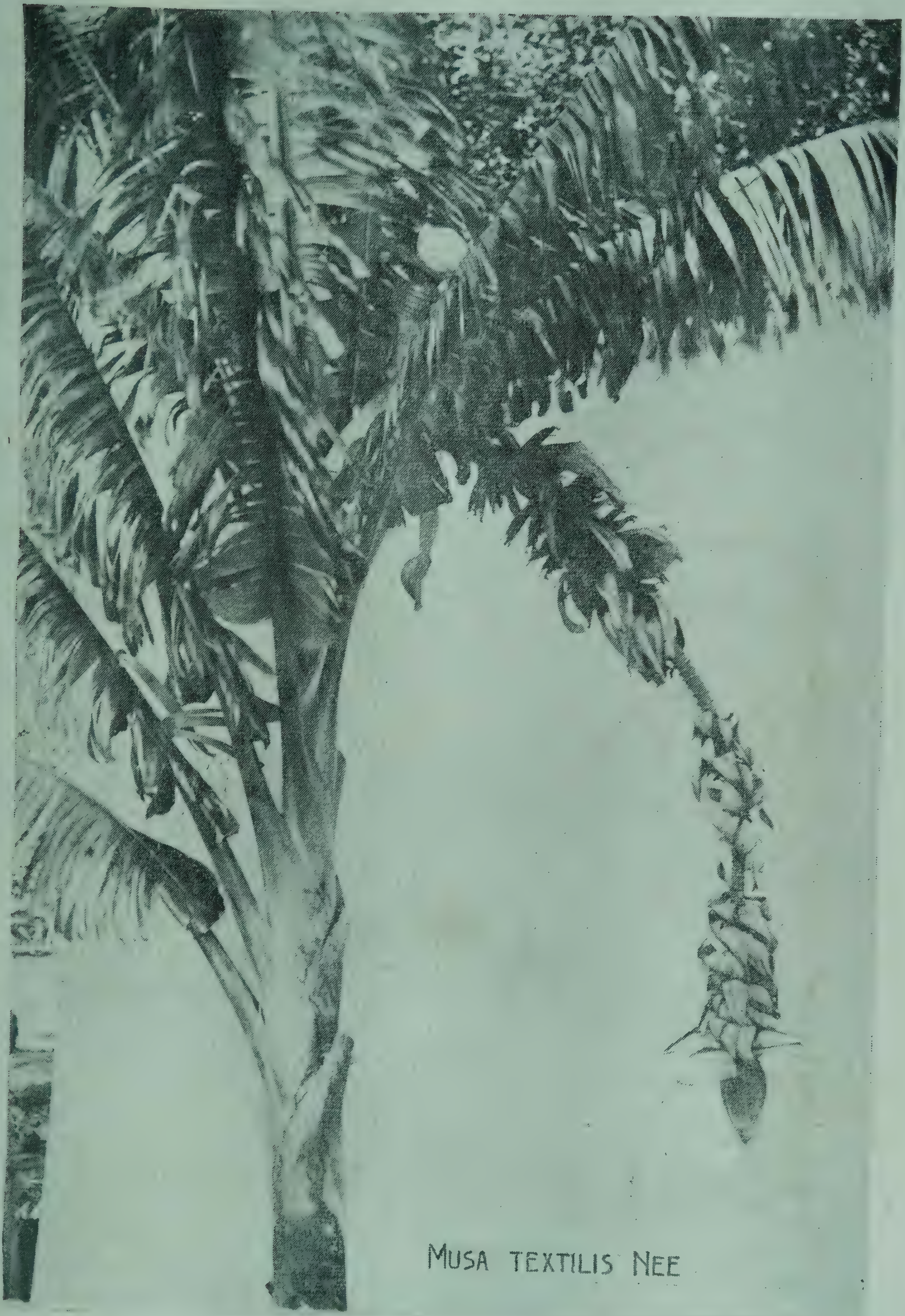
* Vide, Illustrations 76, 77 and 78



MUSA TEXTILIS NEE

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VARIOUS TYPES OF PETIOLES AND LAMINA BASES

PLATE I

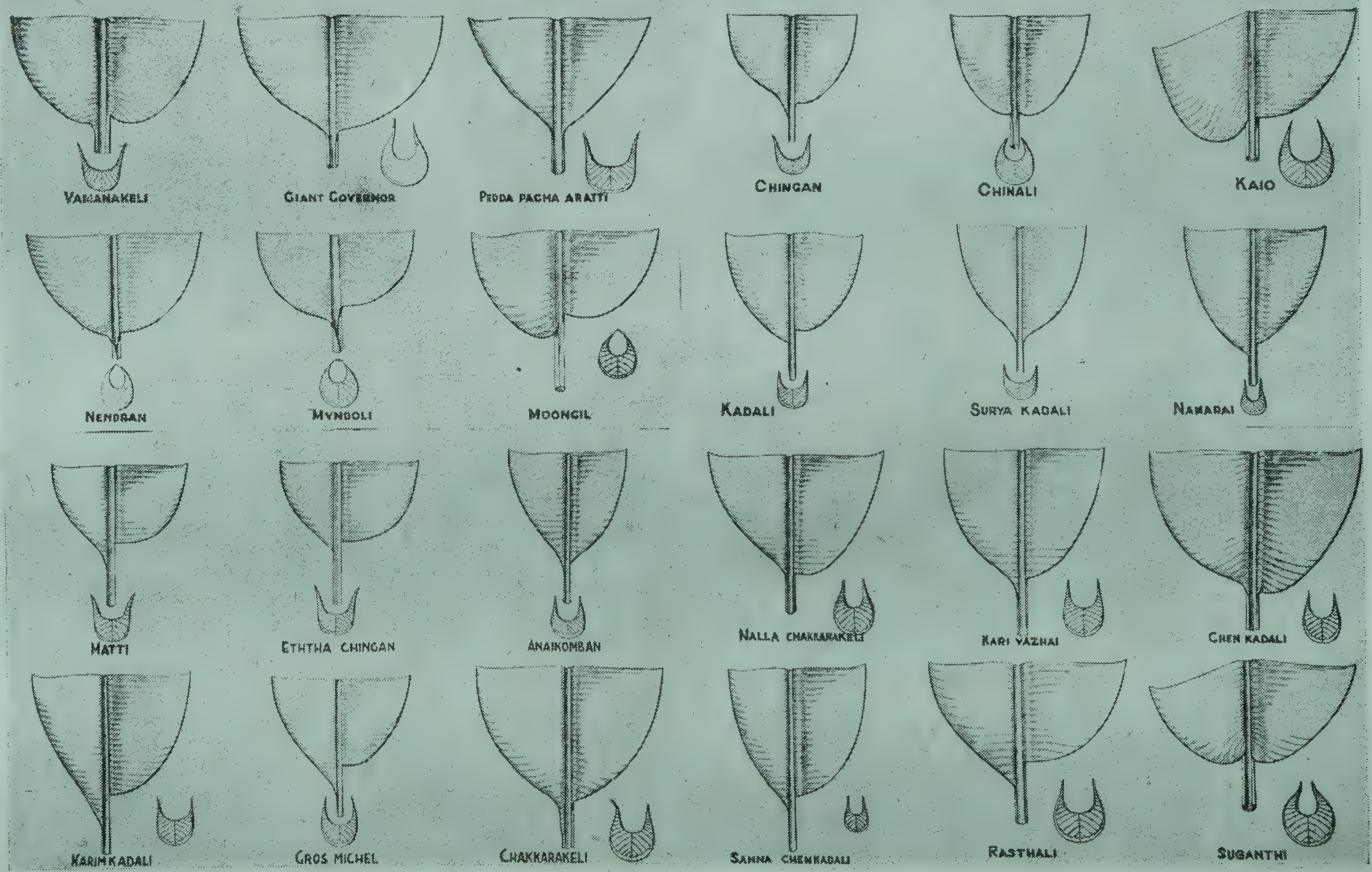

Vamanakeli
Giant Governor
Pedda pacha aratti
Chingan
Chinali
Kaio
Nendran
Myndoli
Moongil
Kadali
Surya kadali
Namarai
Matti
Eththa chingan
Anaikomban
Nalla chakkarakeli
Kari vazhai
Chen kadali
Karimkadali
Gros Michel
Chakkarakeli
Sanna chenkadali
Rasthali
Suganthi

PLATE II

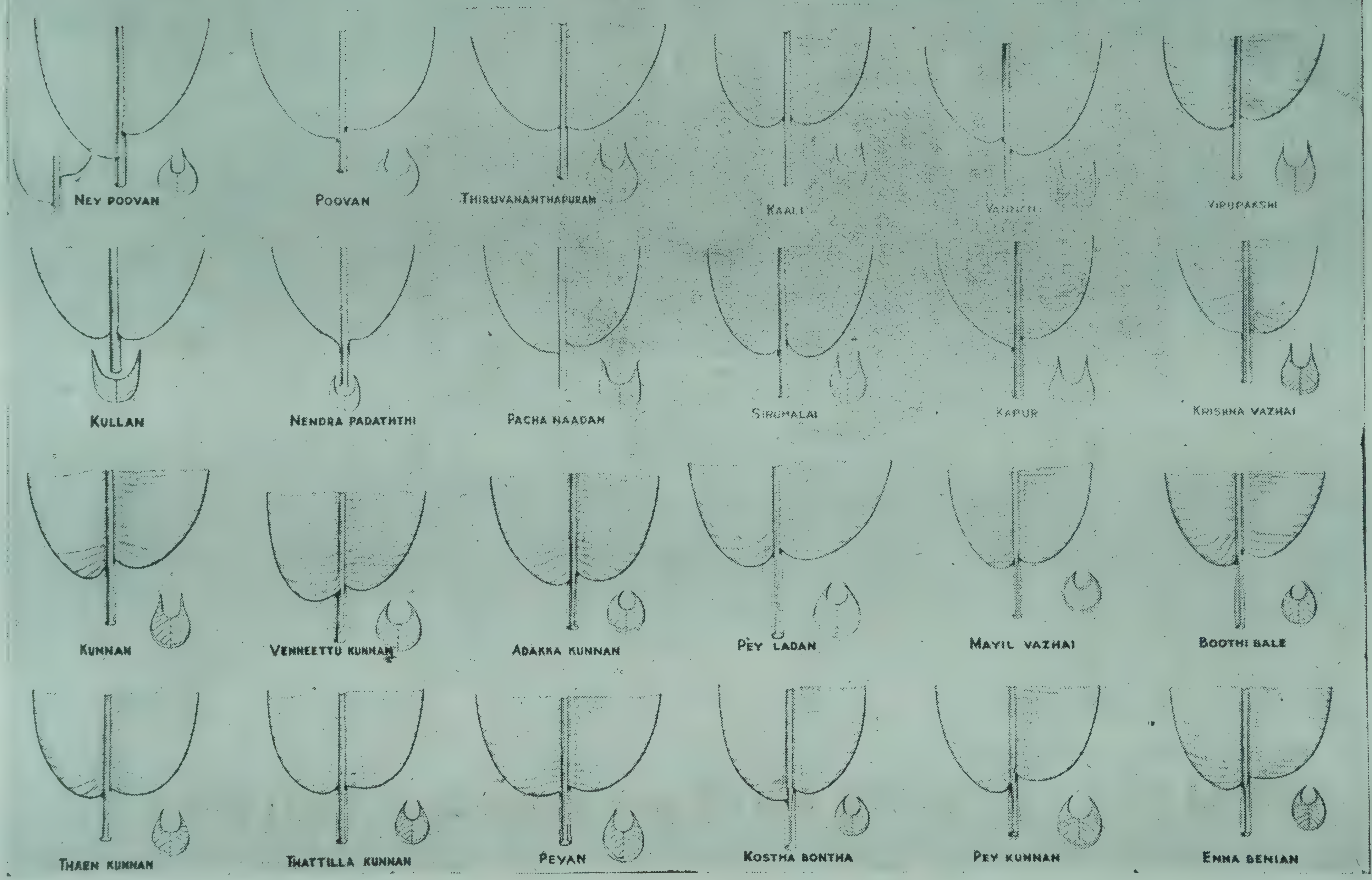
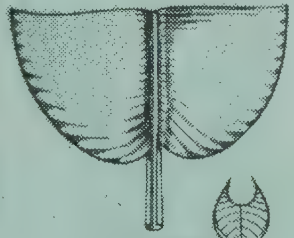
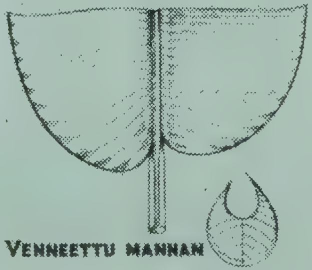
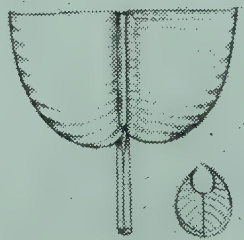
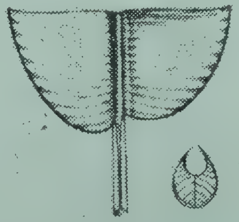

NEY POOVAN
POOVAN
THIRUVANANTHAPURAM
KAALI
VANNAN
VIRUPAKSHI
KULLAN
NENDRA PADATHTHI
PACHA NAADAN
SIRUMALAI
KAPUR
KRISHNA VAZHAI
KUNNAN
VENNEETTU KUNNAN
ADAKKA KUNNAN
PEY LADAN
MAYIL VAZHAI
BOOTHI BALE
THAEN KUNNAN
THATTILLA KUNNAN
PEYAN
KOSTHA BONTHA
PEY KUNNAN
EMNA BENIAN

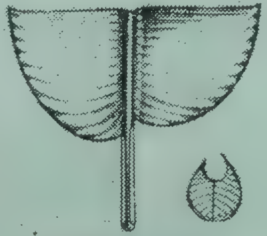
PLATE III

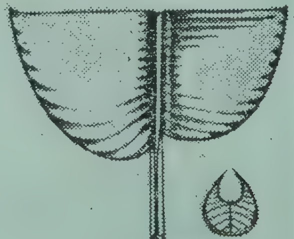

NEY MANNAN

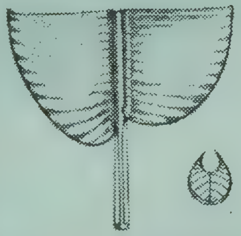

VENNEETTU MANNAN

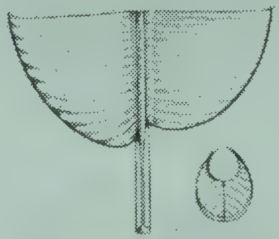

MONTHAN

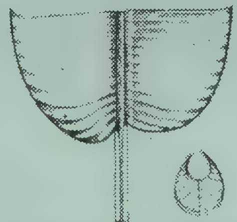

NALLA BONTHA

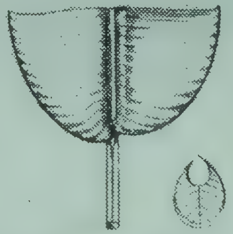

NALLA BONTHA BATHEES

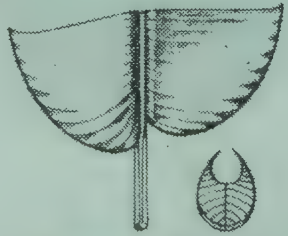

THELLA BONTHA

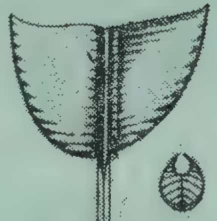

PACHA MONTHA BATHEES

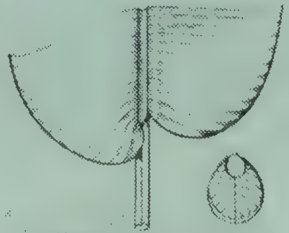

SAMERANI MONTHAN


BOODITHA MONTHA BATHEES


KURI BONTHA


KALLU MONTHAN


ELA VAZHAI


MUSA TEXTILIS NEE

in *Nendran*: the texture of the pulp of ripe fruits, from very soft in *Peyan* to very firm in *Nendran*: the bases of the places of attachment of 'hands' ('wrists') to axis, from mere marks in *Pey kunnan* to projections of ¼ inch and ribbed in *Chingan*: the size of 'heart,' from very small and withered in *Kaali* to very large in *Kallu monthan*: and the duration, from 10 months in *Nendran* to 22 months in *Ela vazhai.* These are the chief features of the variations.

A comparative statement showing weights of banana fruits and their connected parts in some common varieties will be found in Appendix III.

COMMERCIAL VARIETIES OF BANANAS OF THE MADRAS PROVINCE

Poovan is the commonest commercial variety grown throughout the province. It is a popular fruit, the unripe ones being used also as curry stuff. It thrives from sea-level to 5,500 feet and can be easily grown.

Rasthali is also grown in most parts of the Madras province, but not to the same extent as *Poovan.* Its commercial value is only next to *Poovan.* It is one of the choicest varieties and is almost exclusively used as dessert fruits.

Vamanakeli (Canary Islands banana) is grown in many places to meet the demand of the Madras City. It is used only when ripe.

Chakkarakeli is the sweetest of all banana fruits. It is largely grown in the Godavari district, where it is a commercial crop. It is not exported to distant places on account of its poor keeping quality. It is consumed only when ripe.

Virupakshi is a hill banana grown in the hills of the Madurai district between 4,000 to 5,000 feet in elevation. There is a large trade in this variety throughout the southern districts of the Madras province on account of its rich flavour as well as its good keeping quality.

Sirumalai is another hill banana grown in the Sirumalai hills of the Madurai district between 2,500 to 3,000 feet in elevation. There is a large trade in this fruit, most of it being exported to the Madras City. This has also an excellent taste and flavour and has very good keeping quality.

Nendran is largely grown on the Malabar coast. It is an important article of food that side and ranks next to cereals. There is a large trade in this variety both in its ripe and unripe form. Ripe fruits are consumed often after steaming and unripe ones are used for culinary purposes. The ripe fruit has very good keeping quality; but the rind turns dark in colour on flecking.

Pacha naadan is grown to some extent in the districts of Tiruchirappalli and Coimbatore. There is a fairly large trade in the ripe fruit of this variety in Coimbatore even though it is neither rich in flavour nor has good keeping quality.

Ney mannan is largely grown in the southern districts and is mostly used in the unripe state for culinary purpose. The ripe fruits, being insipid, are consumed only occasionally. There is a large trade in this variety in the unripe state in the districts of Madurai, Ramanathapuram and Tirunelveli.

Monthan is grown throughout the central and southern districts of the Madras province and is mainly used in its unripe state for culinary purpose: hence the large trade in it in these tracts. Ripe fruits are occasionally consumed especially in parts of the Coimbatore district.

Nalla bontha is largely grown in the central and northern districts of the Madras province and is mainly used in the unripe state for culinary purpose. Ripe fruits are occasionally consumed. There is a large trade in this variety in its unripe state in the Madras City.

CHAPTER VII

CULTURAL PRACTICES

Forests are cleared and bananas are grown as shade plants for cocoa, rubber and other plantation crops in their early stages in the West Indies, Central America and other countries. Replanting is done every fifth year in the West Indies, but in South India in the mountainous places on the West Coast of the Madras province, it is grown as a perennial crop to serve as shade plant for plantation crops like coffee, citrus, etc., from Coorg to the Palni hills. The cultivation of banana in the latter place follows a system in that all suckers except one to replace the mother plant are removed, dead and old leaves are trimmed before the commencement of the monsoon and the plants are manured. In the lower slopes of the Western Ghats, wherever coconut and areca palms would thrive, bananas are first planted for shade purposes. They are retained only for 3 or 4 years as they become unremunerative by that time but in the plains from the Western Ghats to the sea, they are grown as perennial crops along with coconut, arecanut, mango and jack trees. Since this part of the country gets an annual rainfall of over 100 inches, they are grown as a rainfed crop. A perennial system of cultivation of banana through irrigation is practised in the delta tracts of the river Godavari near Tanuku. Superior varieties like *Rasthali* and *Kunnan* are grown here for many generations. The fruits of *Rasthali* produced in this area do not have the lumps in the pulp as seen in the fruits produced under intensive system of cultivation.

Besides the abovementioned perennial systems of cultivation, a large proportion of banana cultivation in South India is through irrigation in places with low or moderate rainfall. Bananas are grown in the latter case just in the same way as any field crop in rice lands in rotation with rice and sugarcane. Under this system of cultivation the bananas are left in a place from one to five generations. As hereinafter explained if it be for fruits alone the banana plantation is retained for 3 to 5 generations. If it be for both fruits and leaves, it is kept only for one to 3 generations and then in the last generation for leaves. F. N. Howes, formerly of the Kew Gardens, England, mentions that in parts of the Cauvery river delta in the Madras province examples of bananas cultivated more or less to perfection were to be seen. The conditions under which the bananas were grown and the attention meted out to them surpassed those seen in any other part of the East. Under this intensive and careful system of cultivation, the banana fruit grows, it is true, large and matures early but it is at the expense of taste and flavour. The *Chakkarakeli* fruits produced at the Agricultural Research Station, Samalkot, Godavari district, and *Poovan* and *Rasthali* fruits produced at Erode, Coimbatore district and Tiruchirappalli are instances of this. Even the keeping quality deteriorates in these fruits. With the advancement expected in coming years in standard of living, there is a probability of natural conditions in method of cultivation holding the field, as for instance, one may see with variety *Rasthali* grown at Nanjangud in the Mysore State. It is surprising to note the poorly developed, slender and tiny fruits of *Rasthali* grown at Nanjangud sell much dearer in the Bangalore and Mysore markets than the plumpy and attractive fruits of the same variety grown in the Cauvery river delta mentioned by F. N. Howes (34). These Nanjangud fruits are produced under irrigated condition. One may see that it is not necessary for bananas to be grown under rainfed condition in order to develop taste and flavour. It should be grown under as natural a condition as possible without the removal of too many suckers and without the application of much organic manure. Potash manure, however, may be helpful. This type of fruit with superior flavour finds favour with the well-to-do classes but the large majority of people believe in bulk combined with utility.

Banana is an important commercial crop in the Madras province. It yields very good profits especially when grown in the vicinity of cities, towns and places of pilgrimage. Unlike other crops, cultivation of banana is not within easy means of the poor ryots. To cultivate an acre of banana a ryot should have at least Rs. 200, which he often borrows. The comparatively heavy initial outlay involved in banana cultivation has stood in the way in the increase in the acreage under this crop which has remained practically stationary for the last many years. Though the banana is known to people for generations yet a good many of them do not know the proper method of its cultivation. But during a banana survey conducted by the author they were found to evince a deep interest in the matter. The following is, therefore, intended to give in broad outlines some information on the subject :—

Soil and elevation.—Banana can be successfully grown from sea-level to 5,500 feet in elevation in any kind of soil, black, red, clayey or sandy, provided there is enough water for irrigation and good drainage. Though banana needs a good deal of water it cannot stand water stagnation.

Preparatory cultivation.—The land after the harvest of the previous crop should be ploughed well at least four times. After the second ploughing farm-yard manure at 20 to 30 cart-loads per acre should be applied and then the other two ploughings given. The interval between ploughings should be at least a week.

Season of planting.—There is no particular season for planting banana suckers except that they may not be planted during very cold and very hot months.

Planting.—Pits measuring 1½ feet cube should be dug in lines 6 feet to 8 feet apart and exposed to weathering for a fortnight. Immediately before planting suckers, the pits should be filled to three-fourths with a mixture of wood ashes and surface earth.

Spacing.—Different spacing is given according to the varieties and methods of cultivation adopted. When an intensive system of cultivation is desired as in the variety *Vamanakeli*, the distance from plant to plant may be 6 feet either way. In ordinary cultivation as in *Poovan*, *Pacha naadan*, *Monthan*, *Nalla bontha*, etc., the distance may be either 8 feet apart either way or 7 feet apart in rows 8 feet apart, and in the mountainous places for perennial varieties like *Virupakshi* and *Sirumalai* when they are grown as shade plants, the distance either way may be 15 feet.

Rhizomes for planting.—Well-developed sword-leaf suckers or young broad-leaf ones should be removed without damaging the rhizomes four or five days previous to planting. All the roots of the rhizomes should be trimmed, damaged portions of the rhizomes, if any, cleanly sliced off and the top portion of the pseudostem of the sucker above the rhizome may be cut off obliquely to a height of one to 1½ feet from the rhizome and heaped in a shady place. The suckers are at the time of planting, distributed one to each pit and planted upright in the centre of the pit in such a manner that the rhizome is completely buried in the soil. The pit is then filled up with earth leaving about 6 to 9 inches of the sucker (pseudostem) exposed. The soil all round the suckers should be well-pressed in order to give them firm stand in the pit.

A soaking irrigation should be given on the same day of planting or the next day. Subsequent irrigations are to be given once a week in loamy soils, once in three days in sandy loams and every other day in sandy soils. During monsoons, however, such frequent irrigations may not be necessary.

After cultivation.—The first * "*mammotti*" hoeing should be given a month after planting and the subsequent hoeings as and when weeds appear. On an average, 6 hoeings are to be given in the course of a year. Ploughing the area after the suckers have been planted is not advisable as this operation often damages some plants, even though this practice is in vogue in some parts of this Province.

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* A spade-like agricultural implement used by cultivators

In heavy soils where there is water stagnation, trenches about one foot deep and one foot wide should be dug between every two rows during the monsoon months and the water drained off. With every "*mammotti*" hoeing these trenches should be cleaned and gradually deepened in order to facilitate easy drainage. Even though banana requires a good deal of water it cannot at all stand water-logging. The success of a banana crop depends on the drainage facilities the banana area possesses, especially when it is grown in rice fields in rotation with rice and sugarcane.

In soils which are well drained, trenching is not necessary. In such soils the land should be formed into beds, each bed enclosing about 4 to 6 plants in order to facilitate irrigation and conserve rain water.

Manures and manuring.—Bulky organic manures such as well rotten farm-yard manure, powdered "poonac" (oil cakes) of all sorts, tannery refuse, compost, green leaf, etc., are generally applied. A dressing of ammonium sulphate is found beneficial in certain localities. Wood ashes are believed to increase the keeping quality of banana fruits.

When the young plants have put forth 6 to 7 leaves, soil all round the plants to a radius of about two feet and up to the level of the roots is removed. Well rotten farm-yard manure or in its absence powdered oil cake or tannery refuse is spread evenly all round the plants at rates of 2 baskets, 1½ lb. or 2 lb., respectively per plant and covered with earth. A soaking irrigation should be given immediately after manuring.

A second dose of manure should be given when the plants are about to flower.. By this time the suckers would have put forth 7 to 8 leaves. Both the main plant and the sucker should be manured. Manuring in subsequent generations should be similarly done both for the mother plant and the sucker at the time when the mother plant is about to flower and the sucker has put forth about 7 to 8 leaves. Different varieties of bananas require different doses of manure. Generally, heavy yielding varieties like *Vamanakeli*, *Nendran*, *Poovan*, etc., require heavy doses of manure at frequent intervals. Some details of manurial experiments conducted by the Madras Agricultural Department are published in January 1944 issue of the Madras Agricultural Journal.

De-suckering.—Young suckers will begin to sprout from the sixth month onwards. The first and the second suckers should be removed as they appear with a portion of the rhizome by a specially made crowbar without causing injury to the mother plant. The third sucker is generally allowed to come up for the succeeding generation. In some very fertile lands especially on the banks of the river Cauvery even this third sucker is found to compete with the mother plant, when it is cut back obliquely at a height of about two feet. When it grows up again, the cut mark is hardly seen because of the oblique nature of the cut. All redundant suckers that come up subsequently should be removed like the first and second, the object being that only one sucker is allowed to come up for the succeeding generation. When the mother plant is harvested the sucker that was allowed to grow by its side becomes the mother plant in the next generation. In this manner in the course of three years four bunches can be harvested from each stool. The plants in the fourth year can be left for the purpose of leaves and this time three to four healthy suckers can be allowed to come up in each stool. To meet any leaf requirements, from the first year itself one or two rows of plants all along the margins of the plantation may be set apart for this purpose and 3 to 4 healthy suckers allowed to develop in each stool. These will serve also as wind-break. It is the general practice to take 3 or 4 harvests in succession without being replanted; but in heavy yielding varieties like *Vamanakeli* on the East Coast districts, and *Nendran* on the Malabar Coast which are grown as pure stand, only one harvest is taken, since an intensive form of cultivation amounting to 'forcing' is practised in respect of these varieties and the soil, therefore, gets too exhausted to keep the plantation any longer as a paying crop.

Propping.—If there be strong winds when the plants are in bunches, it is advisable to support each plant with bamboo, *Agathi* (*Sesbania grandiflora* Pers.) or other props. Double or single props with artificial forks may be used. In the varieties *Bontha*, *Rasthali* and *Vamanakeli*, propping is not necessary since the first two have very deep and strong root systems and the other is a dwarf variety.

General.—The cone-like inflorescence (heart) should be removed after all the pistillate (female) flowers have developed into fruits. *Agathi* plants may be planted on the outskirts of banana areas as wind-break particularly on the windward side; these plants should be pruned periodically. They provide not only protection for banana as wind-breaks but also the leaves serve as fodder for cattle and as an article of food as vegetable for the owner.

Even though the general practice is as stated above, bananas are sometimes grown as an annual crop in rice fields in the vicinity of cities where there is a steady demand for fruits and leaves. The details of such cultivation are given under "economics of banana cultivation typical of an average crop." In all other places including the East Coast where coconut is cultivated as irrigated or rainfed crop, the bananas are often grown as an interplanted perennial crop.

The cultivation of bananas on the Malabar Coast is of a perennial nature except as regards the variety *Nendran.* They are mainly grown in the backyards of houses or open places in coconut topes. The only cultural operation practised is the removal of the broad leaf suckers and the earthing-up at the foot of the plants, during the commencement of the south-west monsoon in order to give them stability. The suckers so removed are planted in vacant places without being topped but the leaf blades alone are cut off, to the extent of one-half of the length. Fruits grown under such conditions develop good taste and flavour.

The cultivation of *Nendran* on the Malabar Coast follows a different method as set out hereunder :—

Good open land with deep soil having good drainage is selected. The soil is dug with "mammotti" after spreading a layer of cattle manure. Two to four weeks later, towards the end of November, the land is dug up in circles of two and a half feet diameter and nine feet from centre to centre. A pit just big enough to hold a well developed sucker is dug in the centre. After planting, the soil all round is worked once again thoroughly and the earth heaped and pressed moderately. About 550 plants go to an acre. Ten days after planting, cattle manure is again spread in the area and dug in. After two months when the plants put forth two to three leaves the earth is removed from the base of each plant to a depth of four to five inches and to a diameter of two and a half feet and ashes and dried leaves are applied and a ring formed all round with the excavated earth. In April-May, after getting a few showers, these dried leaves are removed and oil cakes especially of *Hydnocarpus wightiana* Bl. (Mal : *Maravatti*) at the rate of a pound per plant mixed with ashes is applied and the leaves are put back. In July, a shallow furrow is made round each plant inside the ring and Niciphos at the rate of quarter pound per plant is applied and covered. Mammotti hoeings are given once in two months. Drainage channels, if necessary, are dug during the south-west monsoon rains. In April-May, yams (*Dioscorea alata* L.), three for every banana, are planted outside the ring equidistant from one another. No manure is separately applied to these yams. Suckers which appear before the month of May are removed with the rhizomes. The banana plants come to flower after six months of planting and are ready for harvest three months after flowering. Infertile flowers (hearts) are cut off after the fruits have set, thereby making all the plant food available for the development of fruits. Though removal of "hearts" in *Nendran* is not done elsewhere, this practice in Central Travancore shows that it is advantageous for this variety also. The bunches are enclosed in cheap baskets made of plaited coconut leaves when they are "quarter-full". This protection against sun and rain makes the fruits, according to the ryots, grow stouter and give them an attractive light green colour. Such protected fruits fetch higher price than the unprotected ones. Because of the forcing nature of cultivation, the flowering of the plants and the maturity of the bunches are uniform and the crop is harvested nine months after planting so as to synchronise with the *Onam* festival, when it fetches very high price. The average duration is about 11 months when grown in the ordinary way without any special treatment. Only one crop is taken. The average yield is about 35 fruits per bunch, which fetch from six to eight annas. The amount realised by sale of suckers is about two annas per plant: each plant yields four suckers on an average. The three yams fetch another two annas thus making an aggregate gross income of 10 to 12 annas for each plant. The crop is entirely rainfed. The ryotss have to get the plants established with the moisture retained in the soil from the north-east monsoon rains so that vigorous growth during the south-west monsoon may be kept up by the timely application of manure. The gross income per acre is about Rs. 350, deducting Rs. 150 for the cost of cultivation, lease of land, etc., a net income of Rs. 200 is left and this is mainly due to the favourable prices ruling during the *Onam* festival. This statistical study was made in November 1941.

Preparation of suckers.—The roots of the rhizomes are trimmed and the shoots cut off leaving two inches on the rhizome. The trimmed suckers are smeared with ashes or dipped in cowdung water, dried in the sun for a day or two and stored for a week before planting. This treatment appears to be a kind of vernalization which may also be responsible for the early maturity of the crop. It is treated as an annual crop. After the harvest, the whole plantation is uprooted and after the preparation of the land, crops like rice, wherever it would grow, tapioca, ginger and other crops are cultivated for two years.

The above is a description of the method followed in Central Travancore where *Nendran* is intensively cultivated.

ECONOMICS OF BANANA CULTIVATION

The profit realised from bananas varies according to the attention bestowed on it and the money spent on the cultivation. Instances are not unknown of South Indian ryots spending sometimes even up to Rs. 650 per acre and realising a net income of Rs. 325.

Details of cultivation of an average crop of a variety of banana, *Nalla bontha*, mainly used for culinary purposes, as practised by ryots of the Chingleput district of the Madras province are given hereunder :—

The suckers are planted in July-August (Tam : Aadi) or in January-February (Tam : Thai). The land after the previous paddy crop is ploughed about 6 times ; in some places after the fourth ploughing cattle manure at rates varying from 20 to 40 cart-loads is spread and the remaining two ploughings are then given. Broad leaf suckers cut to two feet in height are planted, roots trimmed either immediately after removal or after 4 or 5 days, in pits of 9 inches diameter and 9 inches depth dug by small crowbars, 8 feet apart in rows 7 feet apart. Ramming the earth all round the sucker after planting is considered an important operation. Generally the yoke of cattle is used for this work. This is done 3 or 4 times at intervals of 2 to 3 days. The first irrigation is given on the fourth day, but in some places suckers are hand watered the next day. Four or five ploughings at intervals of a week or 10 days are given till the leaves grow large enough to interfere with the yoke of the cattle. After this generally 7 " mammotti " hoeings are given during the life of the plant, i.e., in a year. All suckers are allowed to develop but in most places the suckers are cut back till the mother plant flowers. When the plants are about 5 to 6 months old, farmyard manure at the rate of one basket per plant is applied all round the plant after the soil has been removed and then covered with earth. Irrigations are given once a week or once in 10 days except during rainy months in clayey loams. But irrigations are more frequently given in sandy soils or in sandy loams. The ' heart ' is removed after the fruits have formed. Bunches are harvested from the 14th to the 18th month. The produce is sent to Madras City and sold on commission basis, the agent receiving one to 1½ annas in the rupee. This variety is solely used for culinary purpose. Only one bunch is taken in 1½ years even though the land is taken on lease for 2 years. It is rotated with rice crop for 2 years.

The gross income for the variety *Nalla bontha* per acre is as follows :—

Receipts

	RS.	A.	P
By sale of 750 bunches at 6 annas a bunch	281	4	0
By sale of 750 × 40 (30,000) leaves at Re. 1 per bundle of 200 leaves	150	0	0

Receipts —cont.

	RS.	A.	P.
By sale of 'saragu' (dried leaf sheaths) as fibre	10	0	0
By sale of 'hearts' for culinary purpose	6	0	0
By sale of 'thandu' (central axis) for culinary purpose ...	15	0	0
Total ...	462	4	0

Expenditure

	RS.	A.	P.
Preparatory cultivation	6	0	0
Manuring	40	0	0
Suckers	10	0	0
Irrigations (60 irrigations including 10 by mhote)	50	0	0
Ploughing, hoeing and weeding	25	0	0
Transport charges to Madras	60	0	0
Commission to agents	35	0	0
Lease of land for two years	32	0	0
Total ...	258	0	0

There is thus left a net income of Rs. 200 per acre for two years.

Intensive cultivation of a table variety.—An intensive cultivation of the variety *Vamanakeli* is practised at Sadras near Chingleput. For the last many decades bananas are cultivated at Sadras. The area is limited to about 30 acres confining to the backyards of dwelling houses. The soil is sandy loam. The planting season is September-October (Tam : Purattasi) and suckers are planted 6 feet apart in good soils and 5¼ feet apart in poor soils. The idea for such close planting appear to be to provide shade to the sandy soil to check evaporation. One peculiar system practised in this locality is the planting of tall varieties of bananas in the midst of the short variety *Vamanakeli*, the bulk crop, at the rate of 15 for 100 of the bulk. These tall ones are known as *Pothu vazhai*, and they are planted in the centre of the squares at regular intervals. Being sandy soil, irrigations are given every other day. Generally one crop is taken but occasionally a second also. The land is left fallow for 6 to 7 months after the harvest of the previous crop and again banana is planted ; and in this way without any rotation of crops the ryots are cultivating bananas for the last many decades. The plants are manured heavily and well looked after. The land is kept scrupulously free of weeds. The 'hearts' are removed after the fruits are formed. Fairly heavy bunches are harvested and transported to Madras in boats through the Buckingham canal. In this locality the ryots realise about Rs. 500 net per acre exclusive of all expenses, *Growing of bananas both for fruits and leaves.*—The variety *Nalla bontha* is grown for a dual purpose near Villupuram in South Arcot district. After the harvest of the previous rice crop, pits of 3 feet cube are dug 6 feet apart (1,200 plants per acre) and both sword and broad leaf suckers, stem cut to a cubit in height and roots trimmed of the rhizomes, are planted immediately; and an irrigation is given soon after. For the next fifteen days no other irrigation is made. Meanwhile 2 or 3 ploughings are given and the earth all round the individual plants are rammed with a yoke. Irrigation channels are made around individual plants and are connected to one another. Thereafter 3 irrigations are given per month. Weeds are removed by giving a "mammotti" hoeing. In the sixth month indigo plants are applied as leaf manure at the base of the plant and irrigation channels are shifted to the centre of the rows. A second manuring of groundnut cake at one pound per plant is given when about 25 per cent of the plants bunch. This second manuring seems intended to promote the production of leaves.

All suckers are allowed to develop. On an average there are 5 suckers in a stool yielding about 20 leaves per month from the eighth month onwards. Leaves are harvested from these suckers for the next 6 months, i.e., about 120 leaves per stool which fetch 7 annas (rate being 6 annas per 100). The average price realised from the bunch produced by the mother plant is 6 annas, the price of fruit being 12 annas per 100.

The gross income per acre is about Rs. 975. The cost of cultivation, manuring, etc., come to Rs. 650 leaving a net profit of about Rs. 325. The plantation lasts from 14 to 16 months after which the land is put under ragi crop. This is a fair rate of profit which is attributed to proper cultivation and the large doses of manure applied.

Cultivation of bananas for leaves, stems, etc., other than fruits.—A ryot at Tirupati in Chittoor district grows bananas for leaves in an area of 3½ acres. Pits of 2½ feet cube are dug 8 feet apart and exposed to weathering from 4 to 6 weeks. Well developed sword suckers cut to 2 feet are planted and surface earth is put to the level of the rhizome. Over this, farmyard manure is put leaving about a fourth of the pit to be filled after about 3 months during the "mammotti" hoeing. Once a year at the commencement of the monsoon, earth is removed round the plants to the level of the roots and exposed for 3 days. Either *Cassia auriculata* L. leaves or farmyard manure or both are applied and earthed up. Leaves are cut from the sixth month of planting. Generally one leaf is cut every fortnight in all the varieties except *Ela vazhai* (*Aaku aratti*) in which one leaf a week can be cut. Varieties arranged according to their fitness to be used as plate leaves :—*Nalla bontha*, *Poovan*, *Rasthali* and *Ela vazhai*. The leaves of *Vamanakeli* and *Chenkadali* are unfit to be used as plate leaves because of their fragile nature and their prominent midribs. *Ela vazhai* scores over other leaf varieties in the following points :—(1) It produces more leaves and also at frequent intervals. (2) It yields more suckers. (3) Stems are sold to flower merchants at one anna each for preparing fibre for garland making. The leaf sheaths from the green stem are removed and dried in the shade and used as fibre. (4) Young plants are sold at one to two annas each for decorative purposes. The crop is treated as a perennial one. The ryots realise a net income of about Rs. 250 per acre, the cultivation expenses being met out of the sale-proceeds of the leaves of *Agathi* (*Sesbania grandiflora* Pers.) planted at intervals as forage for milch cattle.

The cost of production and of sale proceeds given in all cases above are those that prevailed before the second world war. The present rates may be taken at approximately thrice those figures.

FORCING OF BANANAS

The circumstances under which the forcing method of cultivation of banana, i.e., the *Nendran* variety, came to be practised on a large scale on the Malabar coast are curious enough, connected with the 'Onam,'—the national festival of the Malabar people. On this occasion the tenants holding lands under the Malabar tenancy system of land-tenure have, according to custom, to make presents to the 'Jenmies' (landlords). It is impossible to think, in this part of the country, of presents in which the *Nendran* fruit does not find its place of pride. A present without *Nendran* involves risks, such as the displeasure of the landlord and the consequent loss of the next term tenancy. The timing of the Onam festival which usually falls in the Malabar month of *Chingam*, corresponding to the English months of August-September, is, however, such as to permit of this 12 months crop being then just 9 or 10 months in the field according to ordinary cultivation. Methods of 'forcing', i.e., making the crop yield quicker have, therefore, to be thought of. This must have become, therefore, a recurring problem for the Malabar ryot in the past. How he solved the problem is described under the section relating to the cultivation of *Nendran* on the Malabar coast described under "cultural practices."

An experiment on the forcing of banana was carried out by the author and it is described below :—

A pit of 5 feet cube was dug in the Banana Experimental Area-garden Soil, Coimbatore, and the same was filled after exposing it to the weather conditions for a fortnight with a mixture of sand, red earth, surface soil, well rotten farmyard manure and 5 lb. of milled groundnut cake. After giving two irrigations at an interval of a week, a broad leaf sucker of the variety *Vamanakeli* was planted with the tips of the leaves cut off as is the practice in Hawaii. This plant flowered after 5 months and 28 days of planting and the bunch matured after 4 months and 13 days of flowering while the same variety planted in the bulk crop at the same time took more than 9 months for flowering and 5 months thereafter for the maturity of the bunch. Thus it is evident that, with the special treatment given, a saving of nearly 3½ months in the life cycle of this variety was effected. In addition to this, the bunch produced was half as much more in size and weight than the biggest bunch in the bulk crop. This special bunch had 12 hands, 201 fingers and weighed 58 lb. while the biggest in the bulk crop had only 9 hands, 130 fingers and weighed 38 lb. Specimens for exhibition purposes can be produced in like manner.

USES OF PARTS OTHER THAN FRUITS

Many parts of the banana plant other than fruits are in almost daily use in most South Indian homes. The most important part used is the leaf as plate for serving food in homes and in some restaurants. Leaves of soft texture with rather thin midribs are generally preferred for this purpose like those of the varieties *Nalla bontha*, *Poovan*, *Rasthali*, *Ela vazhai*, etc. In the vicinity of towns and in places with cheap transport facilities the ryots generally take only one crop of fruit and allow all suckers often up to 5 in a stool to grow up which yield about 20 leaves per month from the 8th month for about 6 months, i.e., about 120 leaves per stool which fetch in normal times about half a rupee while the bunch of fruit from the mother plant yields on an average annas six per bunch. In other places leaves of even the mother plant are harvested from the 6th month. Generally one leaf is cut every fortnight in all the varieties except *Ela vazhai* which yields one leaf per week. The young leaves of these plants are removed before they are fully expanded so that they may be soft, undamaged by wind and greenish white in colour. The lamina portion is cut leaving a quarter of the same on the petiole. This portion of the lamina is sufficient to make the plant yield further leaves but not enough to make it yield fruits.

The bottom portion of the elongated part of the rhizome and the axis (often the basal parts) enclosed within the leaf sheaths, are used as vegetables in making pickles and curries. It is considered helpful in dissolving any foreign matter in the stomach or intestines and it is believed to have the power to dissolve even stones in the bladder.

The 'heart', i.e., the cone-like inflorescence of staminate flowers, is also used as vegetable. The rhizomes of the tender suckers of some varieties like *Nendran* are sliced, cooked and eaten by poor people.

The fibre of the leaf sheath is largely used for tying purposes. The pseudostems, after harvesting of fruits, are cut down and the leaf sheaths are removed and dried in the sun for three days. They are tied into grip-fulls on the fourth day morning. Twenty such grip-fulls are made into a small bundle and ten such bundles will go into a large bundle which fetches about four annas in Madras. Here it is used chiefly for making garlands. If the leaf sheaths are dried in the shade the fibres, though stronger, do not have good white colour. These dried leaf sheaths are also used for making pouches for storing snuff by tobacconists. Investigations on banana fibre are published in June 1945 issue of the Madras Agricultural Journal.

The leaf and stem compost is an excellent manure. The agricultural value of banana trash and stems left on the plantation lies not so much in the quantities of nitrogen, phosphoric acid, potash and minor elements returned to the soil as in the mulching and erosion preventive properties of the material and the organic matter which it provides. Different parts of the banana including fruits are used in the treatment of many diseases. The juice of very young leaves heals burns. The juice from the stem, which is astringent, is employed to check diarrhœa. The juice from the skin of the green fruit forms a good cement for broken china or other earthern ware. The trunk cut into small pieces, is used for clarifying sugar in Siam. The ash of the leaf and of the leaf sheath which is rich in alkaline salt is used in washing clothes like soap. The peel of the ripe banana is used for polishing black shoes. The watery juice which flows from all cut parts of banana is rich in tannin and is used as indelible marking ink.

DISEASES

The bananas in the Madras province are not at present subjected to any widespread serious disease even though Panama wilt and other diseases are noticed in many places. For some time past, however, Bunchy Top disease is playing havoc in North Travancore.

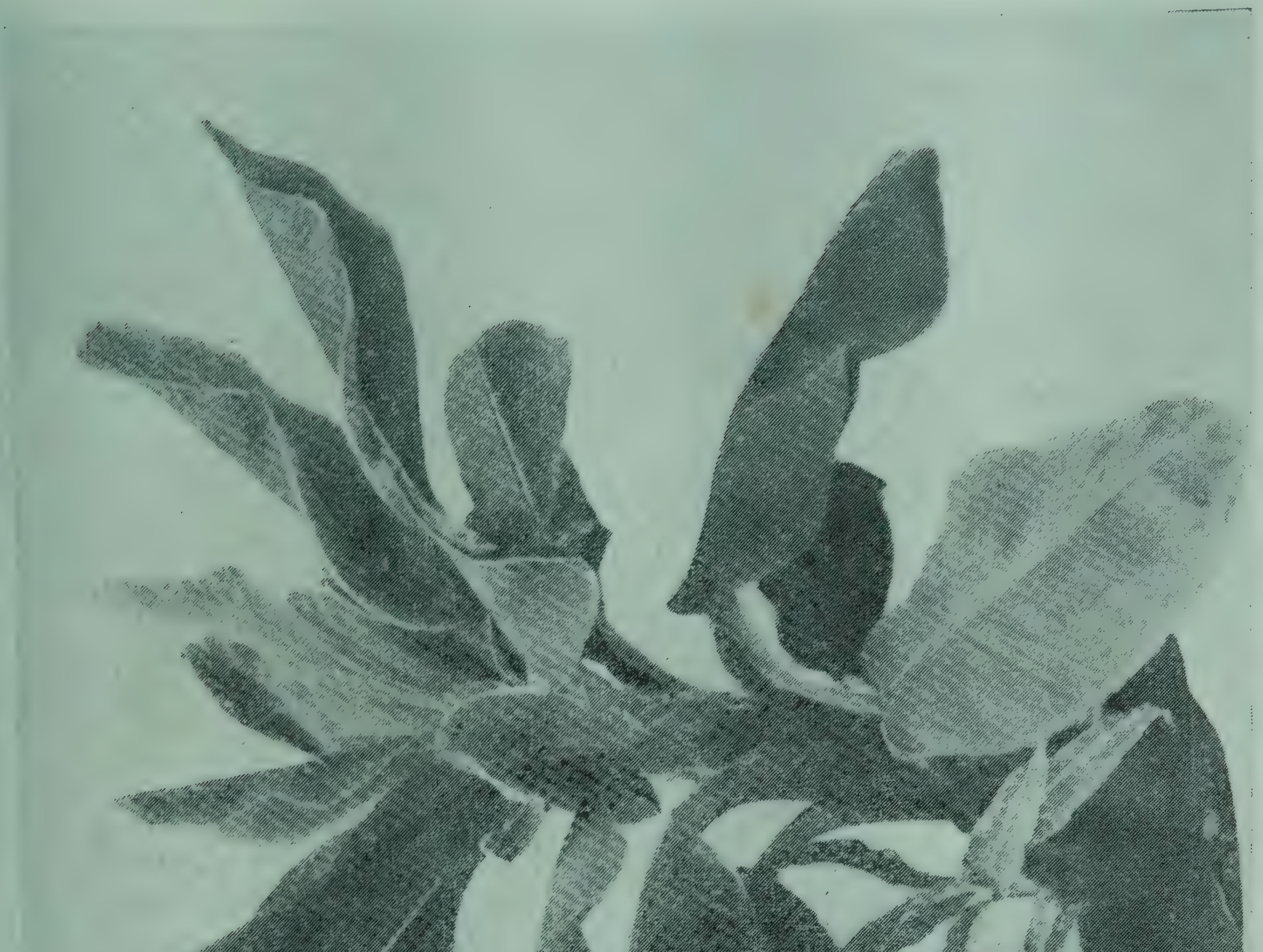
The Government of Travancore are adopting measures for the control of this disease. It has been appropriately called "Kuru naampu" in Malayalam, which means "short spindle".

Bunchy Top.—This disease is prevalent in several parts of the world, viz., Australia (New South Wales, Queensland), Fiji, the Philippines, Egypt, the West Indies, Ceylon and India. In India it is prevalent in Assam and Travancore. This disease has recently been noticed in some parts of the Madras province, e.g., Coimbatore and Samalkot, but only a detailed survey of the banana plantations of the province would give an idea of its distribution in the province. Magee records that all species of Musa are susceptible to the disease (52). In New South Wales, the variety most commonly affected is *Musa Cavendishii* Lamb. (*Musa sapidisiaca* K. C. Jacob var. *cavendshii* Jacob) popularly known as *Vamanakeli* in South India. In South India, however, the variety which is most affected is *Poovan* (*M. sapidisiaca* K. C. Jacob nom.nov.var. *poovaniana* Jacob).

The symptoms of the diseases are as follows: (1) The leaves are short and narrow with the margins distinctly upturned. (2) They fail to bend over normally and retain a stiff, erect position which, combined with the fact that the leaf stalk is greatly reduced in length, gives the characteristic rosetted appearance from which the disease derives its name. (3) The leaves are crisp and brittle when crushed. (4) A definite and unquestionable diagnosis can be made by examining the base of the youngest leaf from the underside through transmitted light. If the plant is infected there will be seen narrow dark green streaks broken in a dot and dash manner or sometimes continuous, lying between and parallel to the clear veins which run out at right angles to the mid rib. (5) Plants in an advanced stage of disease are markedly stunted, there being little growth in height once the plant has taken the disease.

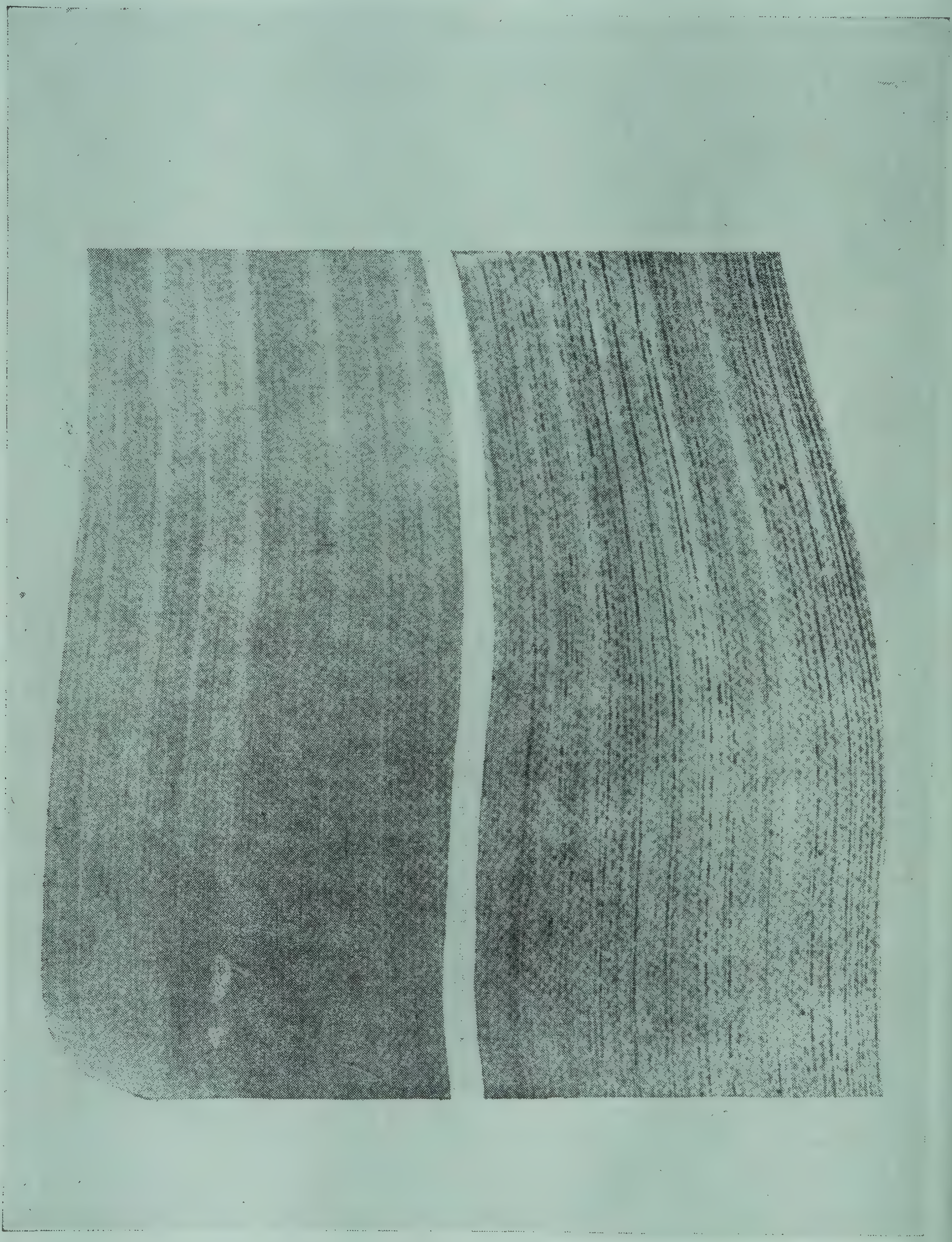
The cause of the disease.—The disease is caused by a plant virus (an ultra microscopic infective particle). The disease is 'systemic', i.e., the virus is present in the sap in all parts of the affected plant. It is spread in two ways. The primary spread is through the suckers taken from diseased plants. Secondary infection is brought about by an aphid (*Pentalonia nigroveroosa*) which functions as the vector. It is only recently, however, that certain details of the part played by the aphid in causing this disease and its spread have been investigated. The results of some of these investigation which should prove of interest to most banana growers are summarised below:—

The disease has been transmitted only by aphids which have previously fed on Bunchy Top affected plants. Up to the present,



79. BUNCHY TOP DISEASE

Vamanakeli (*Musa sapidisiaca* K. C. Jacob. nom. nov. var *cavendishii* Jacob) four months after the appearance of first symptoms, showing intensive rosetting of the leaves (after C. J. P. Magee—Investigation on the bunchy top disease, Melbourne).



80. BUNCHY TOP AFFECTED LEAF

Portions of Banana leaves photographed from the underside by both transmitted and reflected light. *Right* : Leaf from bunchy top infected plant showing the characteristic dark dots and dashes, and lines. *Left* : Leaf from a healthy plant for comparison (after J. H. Simmonds—Plant diseases and their control).

all attempts to transmit the Bunchy Top disease by mechanical inoculation have been unsuccessful.

Nymphal forms of the banana aphid have transmitted the disease in a much higher percentage of cases than have adult aphids. The virus is not transmitted by infective adults to their progeny.

In the experiments conducted, relatively low temperatures of 50° and 59° F., by retarding the bodily activities of infective aphids and their inclination to feed, reduced the number of successful inoculations obtained. This may be of some importance in determining the low incidence of the disease in the field in the winter months.

In order to become infective, aphids must feed for an unusually long period—from 17 to 24 hours or longer on banana plants affected with Bunchy Top.

There is a delay or 'waiting' period in the development of infective power by the aphid after feeding on infected plants. The duration of this incubation period seems to be dependent on the individual aphid and may vary from a few hours to approximately two days. Aphids which have acquired the Bunchy Top virus from diseased plants and which have developed infective power can transmit the Bunchy Top virus by feeding for 1½ to 2 hours or longer on healthy plants, but not when they feed on healthy plants for shorter periods.

When aphids, which have become infective, are transferred daily to fresh healthy plants, they retain their infective capacity for periods as long as 13 days after removal from the infected plants.

The position of inoculation by infective aphids on the leaves of young plants does not greatly influence the rate of infection or the incubation period of the disease.

Whilst much of the knowledge gained from these studies is at present of no direct value in the practical aspect of Bunchy Top control, all the information has a potential value in that it gives a more certain foundation for the control measures at present in use and may help to evolve better control measures not only for this disease, but also for other virus diseases of plants in which sucking insects are also the means of spread.

Bunchy Top control.—(1) The propagation of banana is eminently suited for the perpetuation of the disease. Suckers obtained from diseased plants will always be affected. Consequently suckers for planting have to be selected from healthy clumps only.

(2) Diseased plants must be destroyed as soon as the first symptoms of infection are noticed.

(3) During this operation the aphids may migrate from the diseased plants to neighbouring healthy ones. To prevent this, first pour not less than half a pint of kerosene into the spindle of the affected plant and other plants connected with it in the same stool. Wait for a few hours to allow the kerosene to trickle down round the leaf bases and so kill all aphids present. Then dig out the stool, including the infected plant and any others connected with it, and chop into small pieces to facilitate drying. The plantation has to be examined at intervals to eradicate subsequent infections.

(4) The future replanting in the infected areas must be done only with suckers from a certified Bunchy Top-free area.

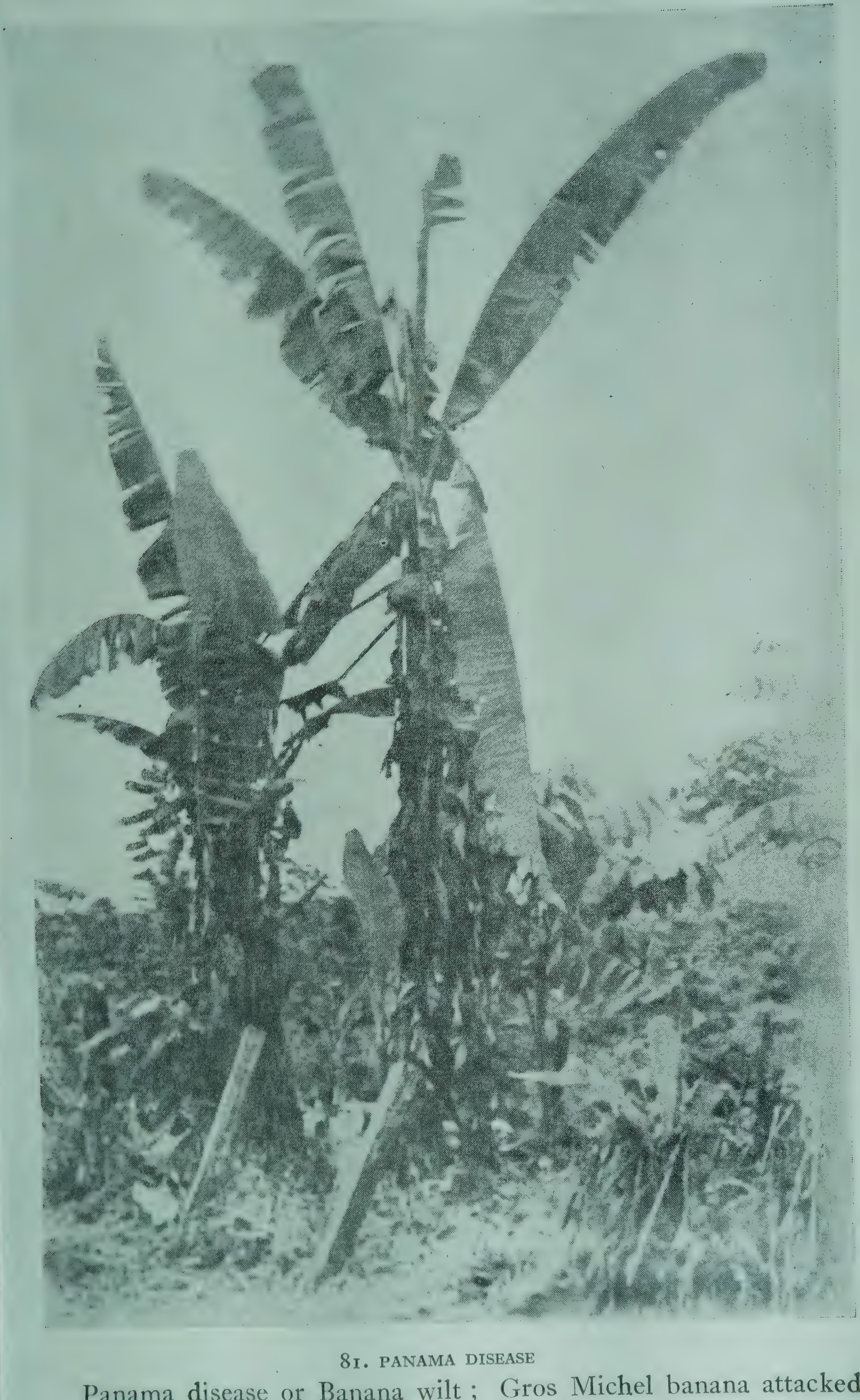
(5) Measures for the exclusion of the disease from unaffected areas and for the eradication of the disease from affected areas are necessary for controlling Bunchy Top. Protective measures are not of much value.

Once Bunchy Top has made its appearance in a plant, nothing will restore that plant to health and immediate destruction is the only means of effecting any good as far as banana-growing is concerned.

The Panama disease (Banana wilt) (88).—The disease which also goes by the name Panama wilt takes its name from the country where it was first known to cause serious loss to the banana industry. It is now widely distributed throughout the world. In the Madras province it has been recorded from Tiruchirappalli, Madurai, Ramanathapuram, South Arcot, Chingleput, Coimbatore and Malabar districts. The varieties usually found affected are *Poovan*, *Nalla bontha*, *Rasthali*, *Sirumalai* and *Ney mannan* (*Chinna monthan* in Madurai). The *Gros Michel* variety of Jamaica is susceptible to this disease. It is caused by a fungus *Fusarium oxysporum* Schl. Var. *cubense* (E.F.Sm.), which is capable of living for sometime in the soil and when a suitable opportunity offers may infect the banana plant through the roots or wounds in the rhizomes.

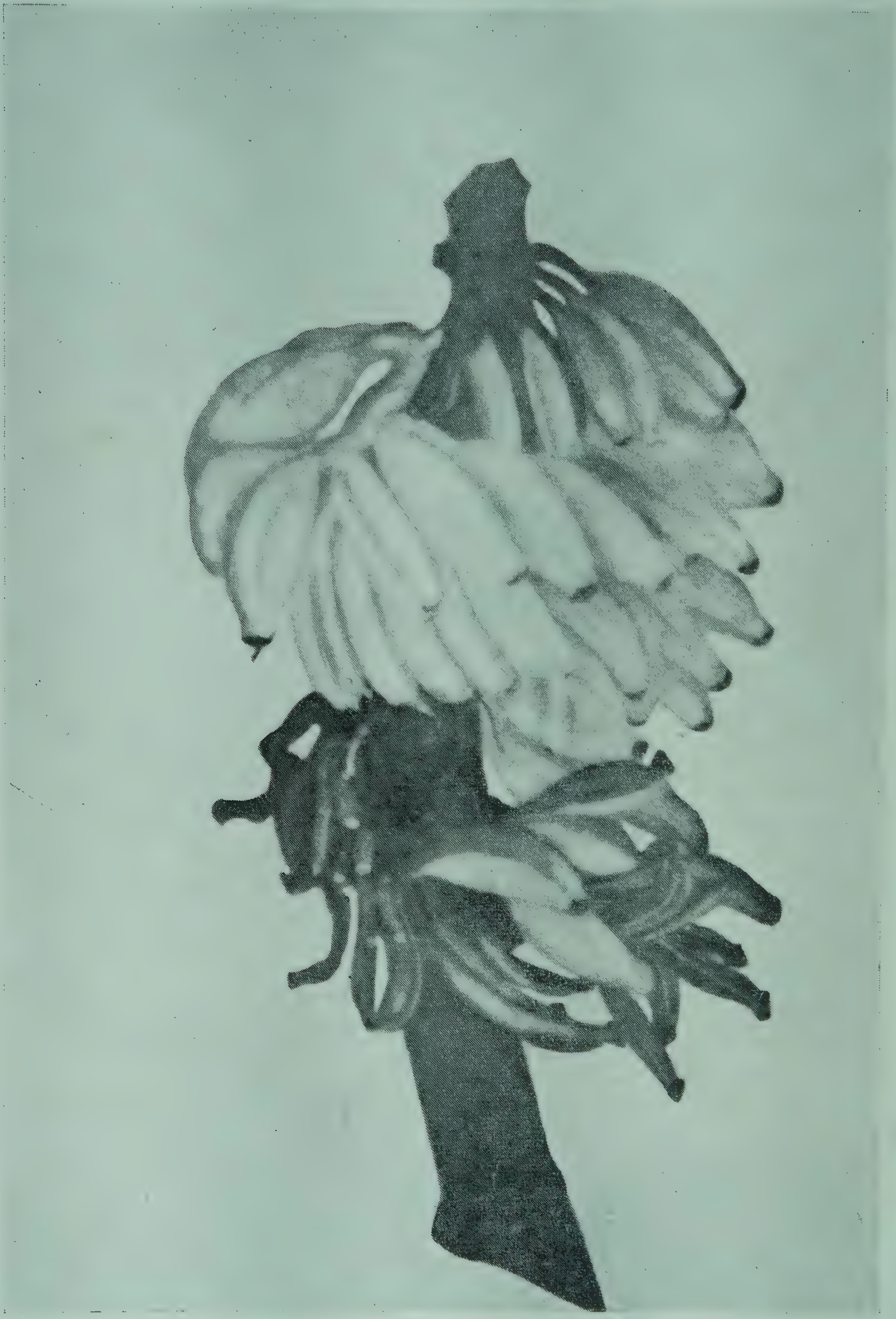
External symptoms consist of the successive drying up of the leaves and the gradual wilting of the plant. To start with, the old leaves turn yellow from the margin or develop yellow spots and dry up. Gradually the young leaves also get the infection and dry up, usually in the order of age. The last leaf alone may be green and stand erect for a time. In some cases the leaves may droop and break down while still green. Often the outer leaf sheaths also split. Bunches are rarely formed and when formed show signs of arrested development.

On cutting the pseudostem of a diseased plant at the base, the cut surface shows red, black or brown spots and streaks marking the



81. PANAMA DISEASE

Panama disease or Banana wilt; Gros Michel banana attacked by *Fusarium cubense* (after E. W. Brandes, U.S. Department of Agriculture, from Phytopathology).



82. ANTHRACNOSE OF BANANA

portion of diseased vascular bundles. In a healthy stem the cut surface is uniformly white. The fungus invades the vascular tissues and disintegrates the walls.

About the year 1925 it was realised in Jamaica that Panama disease of bananas was not amenable to control by ordinary methods of plant protection and investigations were commenced to explore the possibility of producing by breeding marketable bananas immune to this disease. The attempt to breed a substitute for Gros Michel has not been a great success even though one or two promising strains were evolved. The Canary Islands banana is found immune to this disease in Jamaica even though it is susceptible to this disease, to a certain extent, elsewhere.

Control of Panama disease.—If a plant is noticed showing symptoms of disease, the whole stool should be dug out, cut into pieces and burnt.

Susceptible varieties should not be grown in localities where the disease is prevalent.

When an area has become heavily infected it is advisable not to grow bananas for a few years in the place.

Anthracnose of banana.—In India it is found on young and also ripening banana fruits. The infection of fruits generally begins at the distal end, probably originating in the withered remnants of the perianth. The skin turns black and shrivels : finally the whole fruit is affected. As the attack spreads rapidly the whole bunch may be involved. The main stalk may also become diseased. Numerous pink cushiony fructifications of the fungus are seen on the affected fruits and stalks.

It is occasionally prevalent in the districts of Coimbatore, Tanjore and Godavari in the varieties *Ney mannan* and *Vennettu mannan.*

It is necessary to take control measures immediately on noticing the first attack as the disease spreads rapidly. It is controlled by spraying the bunches with Bordeaux mixture.

Diplodia rot.—The manifestation of the disease is the partial decaying of young fruits. A firm dark decay commences at the apex of the fruit surrounding the withered floral parts. This rot extends back slowly for one to two inches in length. There is a sharp line of demarcation between healthy and diseased tissue and the affected fruits ripen prematurely. The disease is caused by a fungus (Diplodia sp.).

Usually only a few fruits show the disease, but occasionally a large proportion of the fruits in a bunch is affected. It is common in the varieties *Karim kadali, Monthan* and *Pacha naadan*, especially when the plants are subjected to water logging.

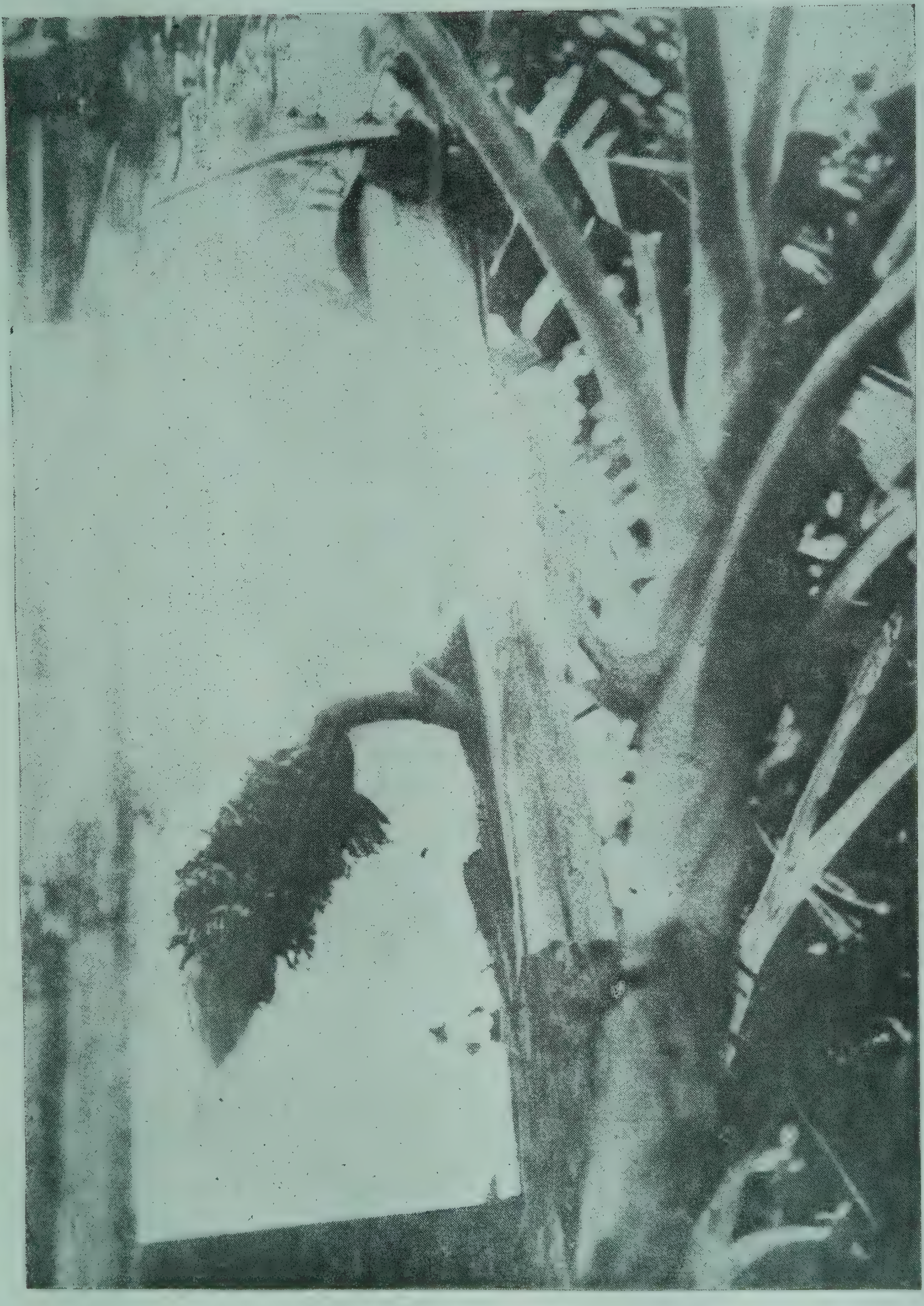
Leaf and Fruit speck (*Macrophoma musae*).—Leaf-spotting caused by *Macrophoma musae* is common in the Philippine Islands, Santo Domingo, Georgia (America), the Congo and India. It occurs in different parts of the Madras province. Leaves whipped by the wind and old leaves with lowered vitality are particularly subjected to the attack. Infections are characterised by the development of brownish to blackish stripes extending from midrib to margins, the surface of diseased areas being rendered rough by the formation of numerous rather large black pycnidia. Frequently they are aggregated, forming circular, raised blackish spots. Since there is the chance of the disease spreading to the young fruits, removal of infected withered leaves is recommended as a precautionary measure.

Drying up of the leaves from margin towards midrib.—This disease is brought about by physiological causes. It is due to the presence of a substratum of limestone " kunkar " within 15 inches from the ground level. The varieties *Kunnan* and *Rasthali* are easily suscepticle to this disease. It is advisable, therefore, that banana should not be grown in such shallow soils.

Freakish emergence of bunches of banana.—The inflorescence very rarely forces its way out from midstem often about 3 feet from the ground level, usually in the varieties *Poovan* and *Rasthali.* The bunches so formed have the ' hands ' and fruits arranged in a conjested manner. The fruits are small in size. This often happens without any apparent cause. It is suspected to be due to some disease which, however, is neither serious nor infectious.

Insect pests.—The banana has not been found to suffer from any serious damage through insects in this country though some insects are found feeding on the plants. These include leaf eating caterpillars like the Castor slug (*Parasa lepida* C.), the tobacco caterpillar (*Prodenia litura* F.) and the black hairy caterpillar of castor (*Pericallia ricini* F.). A small bag worm—psychid (*Kophene cuprea* M.) has been noted feeding on the foliage in parts of the Coromandel coast. These leaf pests are easily checked by mechanical methods alone.

Banana borer weewil (*Cosmopolites sordidus* G) (3).—It has wide distribution all over the tropics and has been noted in Malabar, Tirunelveli and Ganjam till now ; but no serious damage has been noticed so far. It is a difficult pest to check but only preventive methods are feasible. Infested suckers should not be used for propagation. This insect was found in a serious form at Ilanji in the Tirunelveli district. The grubs burrow into the rhizomes under water-logged situations. By providing good drainage and by the



83, FREAKISH EMERGENCE OF BUNCH

application of easily assimilable manures, the plants tide over this attack of insects.

Minor pests of banana include a small whitish lace-wing bug (*Stephanites typicus* D.), and one or two species of spittle bugs and a species of thrips often sporadic in Malabar (*Heliothrips kadaliphila* R.). Sometimes the following scales are found on the fruits :—

Aspidiotus destructor S.—The immature fruits of *Thaen kunnan* are sometimes seen partially covered with this insect at the banana area, Coimbatore.

A. cyanophylli S. is found in the Nilgiris ; *Lecanium discrepans* G. in Godavari ; *L. signiferum* G. in the Visakhapatnam district and *Saissetia nigrum depressum* C. at Coimbatore. They have not, however, been seen in serious form anywhere.

Spraying with fish oil soap is found to be an effective check.

Some general hints for the prevention of diseases in banana are given hereunder :—

The soil should be well drained and made fertile changing the ground from time to time and planting healthy suckers from unaffected areas will be beneficial.

Diseased plants should be uprooted and scorched by fire.

The use of lime and ashes is recommended as a preventive against common diseases of banana.

The control method for all these diseases is more preventive than curative.

The variety *Vamanakeli* (Canary Islands banana) was saved at the Yanuca Island from a disease caused by a minute parasitic Nematode worm by giving a period of rest to the land.

CHAPTER VIII

BANANA PRODUCTS

Both unripe and ripe bananas are put to various nutritive and palatable preparations, some of which are described hereunder.

Banana figs.—Ripe bananas when dried are known as banana " figs ". They are prepared in the following manner :—

Ripe fruits are peeled, split longitudinally into two halves and each half again cut across into three or more pieces about an inch in length according to the size of the fruit, with a stainless knife or a sharp blade made of bamboo. The cut pieces are dried by exposing them to hot sun in wooden or bamboo trays with mosquito net coverings to keep off flies, or wooden trays with glass tops provided with ventilators for free passage of air. If suitable coverings are not used, maggots appear in the " figs " as the result of eggs laid by the flies on them while exposed for drying. The " figs " have to be dried for four or five days in a place free from dust when they will be ready for use. These may be packed in butter paper and stored in closed containers. They keep well for three to four months.

Under-sized banana bunches, which may not fetch good price, normal bunches when there is a glut in the banana market due to over-production and those grown in out-of-the-way places with limited transport facilities, may with advantage be utilized in the preparation of these " figs."

Varieties, the fruits of which are rather juicy, are generally preferred for making banana " figs." The best Madras varieties suitable for this purpose are *Chakkarakeli*, *Nendran*, *Pey kunnan*, *Poovan*, *Suganthi*, *Kostha bontha*, *Vamanakeli*, *Peyan*, *Chenkadali*, etc. *Chakkarakeli* being a very costly fruit is too good for this purpose even though it makes the best of " figs." *Nendrans* also make very good " figs " but are available only on the West Coast where there is a ready market for them and may not be profitable for this industry. " Figs " prepared of the varieties *Vamanakeli*, *Peyan* and *Sirumalai* manifest a deliquescent tendency besides being costly for this purpose.

The varieties that are used for making banana " figs ", should, in addition to their juiciness, also be heavy yielding and be easily grown anywhere even under adverse conditions. The varieties answering these conditions are very few. The best Madras varieties are *Pey kunnan*, *Kosha bontha*, *Poovan* and *Suganthi*. All these varieties can be easily grown under diverse soil and climatic conditions. *Pey kunnan* and *Kostha bontha* thrive even in alkaline soils, though bananas in general are very susceptible to alkalinity.

Banana " fig " making by drying in the sun may be done during summer months or whenever there is a fairly long break in the monsoon. It should not be tried during the monsoon season when the unfinished products get mouldly and become unsuitable for the purpose.

A dehydrator for preparing banana "figs" quickly was tried at the Agricultural Research Station, Samalkot, Godavari district, during 1937-38 and compared with the sun-drying process. The " figs " of *Chakkarakeli* were ready in about 10 hours by the dehydrator at 54°C—65°C, while it took 5 to 6 days at 40°C—45°C by the sun-drying process. Though the finished product was obtained much quicker in the dehydrator, the quality was found poor and the cost of production high. Hot air fruit drier known as the " Etna Pneumatic Drier " is the best for banana " fig " making. " Figs " can be prepared in 24 hours from 130°F to 160°F. Any sort of firewood can be used for this drier. The fruit should be quite ripe and the rind should be removed and the pulp lightly scraped. While in the drier the fruit is to be turned twice or thrice carefully to ensure uniform drying. Expose the fully ripe fruits or the sliced fruits to an atmosphere of sulphurous acid gas previous to the commencement of the drying process ; this gives the " figs " an attractive colour without any injurious effect.

Only well ripe banana fruits should be used for making " figs " otherwise, the " figs " will be hard and less sweet, even though the quantity obtained will be slightly high due to some starch left in the under-ripe fruits. In the variety *Pey kunnan* under-ripe fruits gave 28 per cent, ripe fruits 24 per cent and well ripe fruits 21·5 per cent of " figs." The last one was very soft, sweet and of the colour of honey.

The percentages of banana " figs " to fruits at different stages in the varieties *Chakkarakeli* and *Pey kunnan* are given below :—

	Percentage	
	Chakkarakeli	*Pey kunnan*
The axis (6 inches of peduncle and 3 inches of axis above fruits) to unripe fruits in bunch	11·3	6·7
Ripe fruits in 'hands' to unripe fruits in hands	88·3	88·1
Pulp to ripe fruits in hands	65·9	76·2
Banana 'figs' to pulp	27·6	30·25
Banana 'figs' to bunch (with 6 inches of peduncle, central axis and 3 inches of axis above fruits)	12·6	17·7
Banana 'figs' to unripe fruits in hands	15·3	19·0
Banana 'figs' to ripe fruits in hands	18·2	21·5

It will be seen from the above that *Pey kunnan* yields a higher percentage of 'figs' than *Chakkarakeli.*

Banana 'fig' is a highly concentrated food suitable for travellers. Weight for weight banana 'figs' are more nourishing than wheat bread. A pint of milk and six ounces of banana 'figs' make a good meal. In places where fresh bananas are not easily and economically obtained, banana 'figs' can very well take their place. If the banana 'figs' are sufficiently advertised and popularised in parts of Northern India where bananas are not grown or easily obtained, a good market can be found for the 'figs' produced in South India.

Standardised bunches of 8 or more hands and occasionally of 7 are exported to America and Europe from the West Indies. The undersized bunches fetch only one-fourth the normal price and are therefore not exported; the latter are therefore converted into banana 'figs' with profit. There are several factories at work in Jamaica for banana 'fig' manufacture. The 'figs' used to be exported to European countries at 42 shillings per hundredweight before the second world war. Banana 'figs' were used as part of army rations in Austria; and for all purposes where it was of consequence to have food in small compass.

Analysis of the banana figs of varieties Chakkarakeli and Pey *kunnan**.

	Chakkara-keli	*Pey kunnan*
Moisture	10·85	8·20
Ash	3·48	2·88
Proteins	5·48	2·91
Sugars—		
Reducing	43·29	53·68
Non-reducing	10·66	1·05
Fat, fibre, etc.	26·24	31·28
	100·00	100·00
Lime (CaO)	·116	·123
Magnesia (MgO)	·11	·194
Potash (K_2O)	·195	·141
Phosphoric acid (P_2O_5)	·306	·202
Nitrogen	·82	·47

Banana flour.—Banana flour is made from fully mature unripe bananas, i.e., before the starch is converted into sugar by ripening. Unripe fruits are peeled, cut into thin slices and sun-dried. It is difficult to peel green bananas, but with some experience it can be easily done. If the green bananas are thrown into scalding water (176°F) for four or five minutes the peel is easily removed. Ordinary steel knives should not be used as they turn the cut surfaces of bananas black ; nickel blades or stainless knives should be used. These slices are dried in the sun for about four days when the percentage of water contained in them will be reduced from 70 to 15. These chips are then milled in flour mills and sifted through sieves containing 120 meshes to the square inch. There are factories in the West Indies with vacuum apparatus for the manufacture of banana flour. The flour is packed in boxes or barrels lined with butter paper. It was also exported to England before the war as banana chips, as milling, sifting, etc., are better done there.

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* The analysis was done by the Government Agricultural Chemist, Coimbatore, at the instance of the author.

The percentage of banana flour to unripe fruits varies slightly with different varieties. The percentage of flour to unripe fruits in 'hands' for the variety *Poovan* is 17·5 and for *Adakka kunnan* 21·2. The percentage of flour to unripe fruits in bunches for Poovan is 15·2 and for *Adakka kunnan* 18·3.

*Statement showing the analysis of banana flour of five Madras varieties as compared with rice and wheat.**

	Poovan	*Pay ladan*	*Kunnan*	*Thaen kunnan*	*Adakka kunnan*	*Rice*	*Wheat*
Moisture	10·9	10·3	10·5	10·8	10·2	11·6	12·3
Ash	2·5	2·2	2·5	2·0	3·0	1·2	0·6
Crude proteins ...	2·8	2·8	2·9	2·9	4·9	6·6	10·2
Ether extractives ...	0·8	0·5	0·6	0·4	0·9	0·1	1·3
Crude fibre	0·8	0·9	1·3	0·7	1·4	0·1	0·3
Carbo-hydrates ...	82·2	83·3	82·2	83·2	79·6	80·4	75·3
Total ...	100·00	100·00	100·00	100·00	100·00	100·00	100·00

Banana flour is also known as banana meal. It is rich in carbohydrates and minerals, but poor in protein. The starch of banana is more easily digestible than cereal starch.

The British Medical Association recommends the use of banana flour in infant feeding. It is cheap and wholesome, possessing a high nutritive value. It can be made in a few minutes by mixing up a heaped table spoonful (one ounce) of banana flour with a pint of water and then boiling for five minutes. A gruel made in this way has excellent colloidal properties when added to milk in equal quantity ; it thickens the milk and prevents formation of a leathery coagulum of casein and satisfies the appetite of hungry infants more effectually than diluted milk. Banana gruel is particularly suited for patients recovering from typhoid fever and is excellent in cases of dysentery and similar abdominal complaints. In cases of chronic dyspepsia and gastritis, properly prepared banana flour is easily digested.

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* The analysis was done by the Government Agricultural Chemist, Coimbatore, at the instance of the author.

Banana flour is a common infant food on the West Coast of the Madras province (Malabar, Cochin and Travancore). The flour of the varieties *Adakka kunnan* and *Nendran* is used for this purpose. Non-juicy varieties are generally preferred. The flour of *Kunnan* group (*Adakka kunnan*, *Kunnan*, *Venneettin kunnan*, *Thaen kunnan* and *Thattilla kunnan*) is considered superior to that of other varieties. The flour of *Nendran* has a high percentage of calcium and phosphoric acid. The food stuffs and fodders of the West Coast of the Madras province are generally deficient in these two minerals ; but nature had adjusted itself to the requirements of people by making this variety of banana an important article of food on this coastal region, while it is not much liked by people in other parts of the province. The flour of *Adakka kunnan* contains double the quantity of protein that is usually found in the flour of any other variety of banana ; and it is a happy coincidence that the flour of this variety has for long been in use in Malabar as an important item of infant food.

India annually imports about Rs. 38,00,000 worth of starch for various purposes. India with its vast resources ought to be able to produce its own starch from bananas, for, many varieties which are suitable for making flour are found in India especially in the Madras province. It is not the actual percentage of starch that matters but the total quantity that can be produced per acre. One acre of banana produces starch equivalent to five acres of potato and ten acres of wheat. In consideration of cheap labour in India, cheap production of starch ought not present any great difficulty.

Bread and biscuits are made of banana flour in foreign countries with the addition of wheat flour. The banana bread is uniform in texture, permanently moist, golden in colour and very nutritious. Banana flour is particularly suitable for the manufacture of yeast used in breweries.

There is ample scope for the development of banana 'fig' and banana flour manufacture, as cottage industries in many parts of the Madras province where favourable conditions prevail. Experiments on banana 'fig' and flour other than those given above are published in December 1943 issue of the Madras Agricultural Journal.

Banana jam—Ingredients—

One hundred ripe fruits of *Poovan* or other varieties mentioned below :—

Six pounds of white sugar

Three pieces of cinnamon bark
Juice extracted of 6 limes.

Well ripe bananas after peeling are cut into thin slices, boil these slices for half-an-hour in water just enough to cover them, stirring all the time. Take out from fire and macerate the pulp well. Add sugar and boil it on slow steady fire and add lime juice and cinnamon bark when the stuff begins to thicken. Remove from the fire when the consistency of jam is reached. On the whole, it has to be on fire for about four hours. The cinnamon bark has to be looked for and removed before the jam is bottled. If under-ripe fruits are used, they impart a kind of tannin taste.

Banana jelly—Ingredients—

One hundred ripe fruits of *Rasthali* or other varieties mentioned below :—

Six pounds of white sugar
Three pieces of cinnamon bark
Juice extracted of 3 limes.

Well ripe bananas after peeling are cut into thin slices. Boil the slices for half-an-hour in water added just enough to cover them, stirring the contents all the time. Take out from fire and macerate the pulp well ; add again two pints of water and mix thoroughly. Put the stuff into a cloth sieve of medium meshes that will permit straining and enable the juice to be extracted by repeated squeezings. The juice thus yielded is then processed as for jam. The scum, as it appears during the process, has to be removed. Enamelled or aluminium vessels and charcoal stoves of the cheap type ' Kummatti ' may be used for making jam or jelly. The varieties *Poovan*, *Suganthi*, *Chakkarakeli* and *Rasthali* are best fitted for jam or jelly. The juice could be thoroughly and easily extracted in squeezing by mixing one lb. of well-washed paddy husk with the macerated pulp. *Rasthali* has 3.64 per cent calcium pectate [73 (*a*)].

Banana ' halva '.—Well ripe bananas, after peeling, are cut into pieces of an inch length and boiled for half-an-hour in water added just to the extent of covering these pieces, these having been stirred all the time. Take out the vessel from fire and macerate well so as to make the pieces plastic. Now add sugar to taste and keep the vessel again on fire and stir well till all the water evaporates. Then add ghee (clarified butter) and beat with a long-handled spoon till the stuff becomes a loose mass susceptible of being cut into pieces in time. Spread the hot stuff in a shallow vessel and keep overnight. It then becomes fit for cutting into pieces of such shape and size as may suit the fancy. The ' halva ' keeps for a few months. The variety *Nendran* and its various forms are best suited for making banana ' halva '.

Banana fritters.—Well ripe bananas preferably of the variety *Nendran*, *Gros Michel* or *Kapur* are used for making these fritters. The fruits are peeled and sliced lengthwise into pieces of quarter inch thickness and cut in the middle. Rice or American flour (corn flour) with sugar, one beaten egg for a dozen fruits and a pinch of salt are mixed with enough water so that the banana pieces, when dropped into the mixture, sink slow. The sliced banana pieces are dipped into this mixture and taken out to be fried in oil or ghee or other cooking medium. The fritters can be kept for a day or two and are served hot or cold according to individual taste.

Banana chips.—The process of making banana chips, fried or dry, is described under *Nendran*. The varieties *Monthan*, *Sambrani monthan*, *Nalla bontha* and *Kaio* lend themselves well for making these chips.

Banana " *candy* ".—The process of preparing this, is given under *Rasthali*. *Nendran* and *Boothi bala*, equally like *Rasthali*, yield these " candy ".

" *Pazhaprathaman* ".—The process of preparation of this delicacy is described under *Kadali*. The *Nendran* fruits are also used for this preparation.

" *Panchamritham* ".—The process of making it is given under *Kadali*. The *Virupakshi* fruits are also used for this preparation.

Banana beverage.—Well ripe bananas are peeled and mashed in water and kept overnight. Next day it is strained and bottled and allowed to ripen. After a week it becomes a pleasant drink. The variety *Nendran* and its forms are better suited for the preparation of this beverage than soft-pulped bananas.

Ten or twelve well ripe *Nendran* fruits are mashed well in a trough and two gallons of water added. This in two hours' time ferments and froths. In four hours it is fit to be used as a drink. It is bottled at this stage and it can be kept for a full day. There is yet another method practised. Well ripe fruits of *Nendran* are cut into pieces of half an inch length and two gallons of water are added and the mixture is allowed to stand. On the third day it becomes a delicious drink.

Banana coffee.—The rind is removed from the unripe fruits which have to be used for making this beverage. Should the removal of the rind be found difficult, it can be facilitated, by dipping the fruits in boiling water for a few seconds. With stainless steel knives the fruit is quartered lengthwise and cut into pieces approximately two inches long. The pieces are then placed on wooden trays and kept in the dehydrator for 9 hours at an approximate temperature of 120°F to begin with. Then the temperature is raised to 130°F. and the process is continued for another 9 hours. At the end of the 18-hour period, the fruit is ready for roasting which is carried out in an ordinary coffee roaster. Care must be taken during roasting to see that the pieces do not stick to the sides of the roaster. Definite information cannot be given as to the exact temperature to be maintained at the time of the roasting. It is a matter to be found by actual experience. The temperature will vary according to the condition of the fruit received from the dehydrator, and according to the colour of the roasted stuff desired by the manufacturer. When the product is bone-dry, it is ground in an ordinary coffee mill. The loss of weight from the fresh state to the ground product is about 80 per cent.

In many instances banana 'coffee' is used pure, but other products have now been made by blending it with commercial coffee.

The method of using the banana 'coffee' will vary according to individual taste, but the following procedure is reported to give satisfactory result :—to make a pint of beverage, take two heaped tea spoons of the banana 'coffee' and boil in half a pint of water for ten minutes ; then strain and to this liquid add half a pint of milk and sugar to taste. Banana 'coffee' is also being used as a flavour for chocolate.

DIETETICS OF BANANA

There is an impression that bananas should be eaten sparingly and only by people endowed with good digestive powers. It is said that partially ripened bananas cause when eaten, intestinal disturbance. The well ripe banana, however, is not only a fruit of remarkably high food value but it is also easy to digest. It can be eaten with safety and relished by every one, infants included.

No fruit compares with banana in point of easy assimilation. Banana is cheaper than most of the common fruits. Four well ripe bananas with buttered brown bread and a glass of milk make a wholesome, well balanced and satisfying lunch for children.

A well ripe banana has a high energy value ; about 100 calories to each average banana or 460 calories to the pound—a unit greater than for any other fruit, or vegetable, or even milk, rice or fish.

The banana contains three essential vitamins A, B and C. It contains vitamin A in a quantity equal to any vegetable ; vitamin B content is equivalent to tomato juice and C compares favourably with oranges and tomatoes. The other important fruits like orange, grape, etc., are mainly sources of vitamin C only, whereas, banana contains A and B in addition (2).

The fruits of some varieties of bananas, besides having medicinal properties, possess power to increase resistance to diseases, if regularly taken. The curative effect of banana is amazing in the case of a scurvy patient. Banana and milk should have an important place in the diet of delicate children. Infants take to ripe bananas well and digest them satisfactorily ; and when fed regularly, they steadily gain in weight. A New York specialist renowned for success in treating diseases of the stomach and intestines recommends avoidance of all carbohydrates except those of the extremely ripe bananas (118).

Banana is a notable laxative, especially the varieties *Peyan*, *Poovan*, *Monthan* and *Boothi bale*. The fruits of the varieties *Karim kadali* and *Kunnan* are good for intestinal diseases. The fruits of *Namarai* are considered a good tonic. *Nendran* is rich in lime and phosphoric acid. A large number of delicious dishes are prepared out of ripe banana in America, Australia and parts of Europe. Banana occupies a high place in India for food values both as ripe fruit and unripe fruit for culinary purpose. Many palatable dishes are prepared of both ripe and unripe fruits and they are described under " Banana products ".

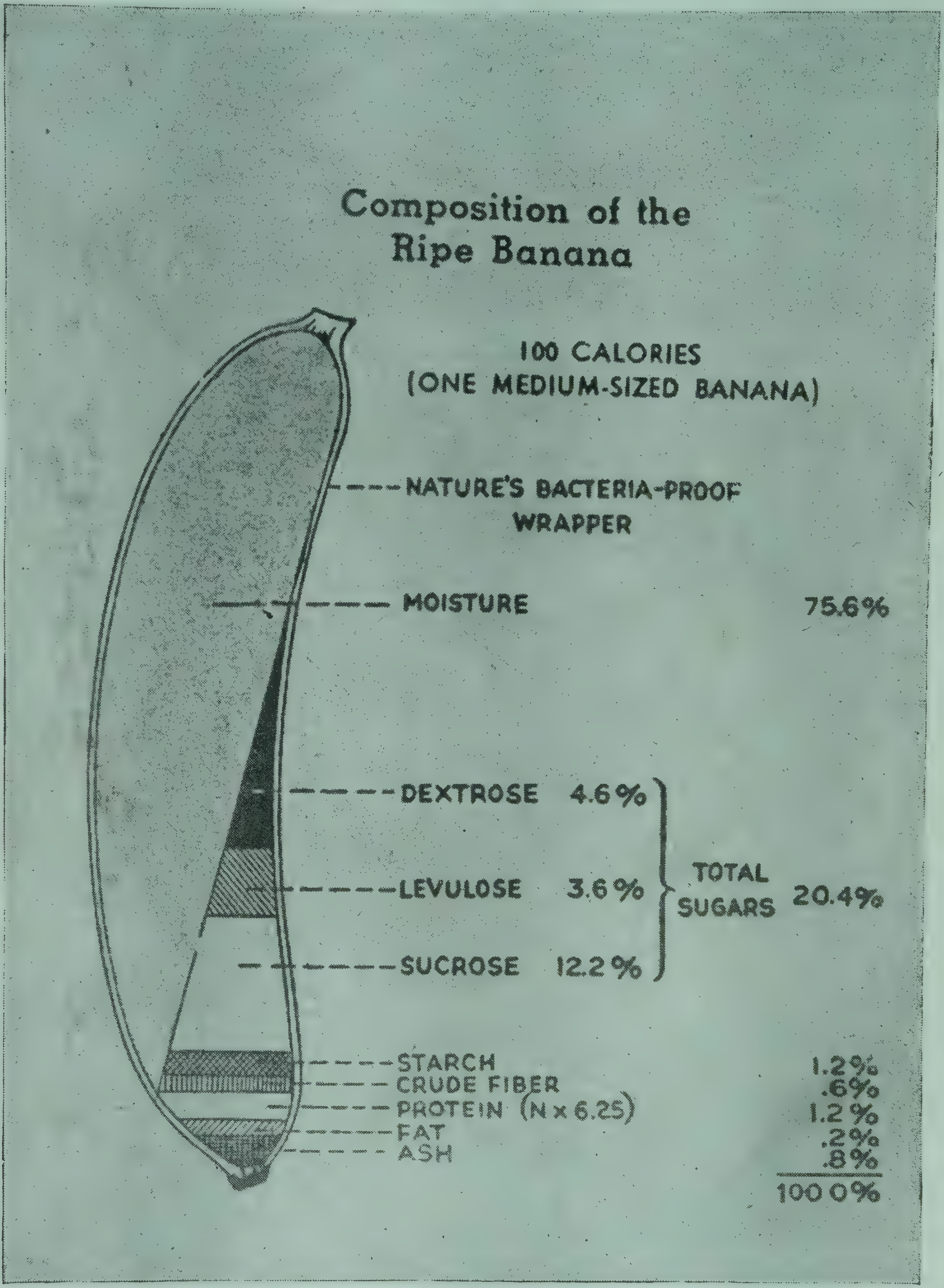
The banana has an alkaline ash ; therefore it has the ability to correct acidosis caused by acid-forming diets. It contains a large percentage of both fattening and non-fattening sugars, which are readily assimilated by the body. This high sugar content does not cause an increase in bodily weight when taken in ordinary amounts by adults. The quickly satisfying or satiety value of banana makes it important in the diet of those who want to reduce their weights.

During the ripening process of the banana, the starch is converted into sugar. This change is not completed until the yellow peel is flecked with brown and the pulp has softened. Bananas are seldom found in a retail store at this stage of ripening. It is usually the green-tipped or the yellow fruit that is purchased. Before consumption it should be allowed to ripen at a temperature of about 70°F. Bananas should never be kept in a refrigerator as a low temperature retards their ripening. It has a composition of about 75 per cent of moisture, 20 per cent of fruit sugars and the remainder —about 5 per cent is composed of starch, protein, fat, fibre, pectins, vitamins and minerals. Of the minerals, calcium, chlorine, copper, iron, magnesium, manganese, phosphorus, potassium, silica, sodium and sulphur are found in minute quantities.

The superstition is rife that bananas are bad for those who desire to lose weight and further that they should never be eaten by the sick. Both notions are erroneous. It is a wonderful fruit for obesity and for increasing weight ; a seeming paradox. In 1934 Dr. Harrop of America discovered that an exclusive diet of skim-milk and bananas had the required effect of reducing weight on his worst patients ; six bananas and four glasses of skim-milk furnishing no more than 960 calories daily. In ten days the decrease in some cases was nine pounds. For underweight persons ripe bananas and milk added to the usual food help them to fatten.

In cases of illness they are valuable as being mildly laxative. Babies suffering from celiac disease recover when fed with mashed banana. The best method is to begin with a spoonful of banana pulp, well beaten into the milk. Dieticians now regard bananas as a curative food, for they have proved invaluable in cases of colitis, diarrhœa, constipation, typhoid fever, deficiency, gout and cordiac diseases. Include well ripe banana into the diet and it will not only satisfy the appetite but make one feel energetic.

NOTE.—Some Banana Recipes are published by the Department of Agriculture, Madras : Leaflet No. 117.



84. COMPOSITION OF THE RIPE BANANA.
(After Elizabeth Walker, R.N. from the Oriental Watchman, Feb. 1945)

CHAPTER IX

ANALYSIS OF THE FRUITS OF VARIETIES OF BANANA

The banana contains most of the food material required for the human system. There is a slight deficiency in protein and fat in a banana diet but it can be made up by the addition of milk with banana. Indian sages, having realised this, lived on banana and milk. Some of the good Madras bananas, viz., *Chakkarakeli, Rasthali*, *Thattilla kunnan*, *Kadali* and *Karim kadali* contain about 1·7 per cent protein, a percentage much higher than that of the world famous Gros Michel, almost the only variety exported to America and Europe from the West Indies, which contains only 1·22 per cent protein. The Cavendish or the Canary Islands banana, largely exported to Great Britain and other parts of Europe from the Canary Islands, contains only one per cent protein.

The banana is especially valuable as a rich source of easily assimilable carbo-hydrates. Even in this respect some of the Madras varieties excel as they contain more than 24 per cent as against 17·72 per cent of Gros Michel and 15·04 per cent of carbo-hydrates of Canary Islands banana. The actual percentages of some of the Madras varieties are given against each :—*Ney poovan* 27.7 per cent, *Nendran* 26.4 per cent, *Chinali* 25.82 per cent, *Krishna vazhai* 24·98 per cent, *Venneetu kunnan* 25·4 per cent, *Kostha bontha* 25·32 per cent, *Thaen kunnan* 25·01 per cent and *Boothi bale* 24·50 per cent.

Banana contains many salts which the human system requires in appreciable quantities such as phosphates, sulphates and chlorides of potassium, magnesium, calcium, sodium as well as significant quantity of iron. Taking one of the salts, phosphoric acid, the analysis shows that the Madras bananas are superior to Gros Michel and Canary Islands banana which contain 0·056 per cent and 0·055 per cent respectively, whereas the percentage of some of the Madras varieties are as under :—*Kapur* 0·11 per cent, *Ayiranka rasthali* 0.11 per cent, *Thella bontha* 0·10 per cent, *Chakkarakeli* 0·097 per cent and *Venneetu kunnan* 0·097 per cent.

The rind of the banana, judging by proportion of weight, contains more ash, yielding more salts than the pulp itself. The rind is not used for human consumption except that of the unripe *Nendran* and its various forms which is a good curry stuff. The rind of the other varieties, however, is given to cattle.

Under-ripe bananas contains a large percentage of starch and has therefore a deleterious effect being hard to digest ; whereas a well ripe banana is rich in glucose—that wonderful fruit sugar which energises the body soon after consumption. An unfailing guide to ripeness in banana, especially where children have to be fed, is the appearance of brown flecting on the yellow skin. At this stage the fruit literally melts in the mouth. A well-known maxim is, buy bananas when yellow and eat when flecked. Scientific ripening is essential to change all the indigestible starch into digestible sugars and to impart the delightful aroma and flavour. In America, England and Australia there are specially constructed ripening chambers. In the Madras Province quick ripening is effected by enclosing the unripe bunches of bananas in specially constructed chambers into which smoke is forced in through a small opening by fanning. When sufficient smoke has been sent in, all the openings are sealed to prevent the escape of smoke. The chamber is opened the next morning and the bunches are taken out when the colour of the fruits is turned yellowish. The bunches are then dipped in cold water and arranged in a standing position in a partially closed room till quite ripe. The materials used for producing smoke contain *inter alia* green leaves. This smoke contains ethylene gas, which is used in foreign countries for promoting ripening in bananas.

Chemical analysis of the pulp and rind of (1) ripe fruits and (2) unripe fruits used for culinary purpose, of the Madras banana varieties is given in Appendix IV.

APPENDIX I

The various local names of the Madras Banana varieties with names of one or more places where they are prevalent.

1 VAMANAKELI—

Basarai	Kirkee (Bombay)
Gidda aratti	Madanapalle (Chittoor)
Guja bale	Coondapoor (South Kanara) ; Bangalore ; Arevenu (Nilgiris)
Gujari bale	Bhagamandala, Ponnampet (Coorg)
Hara mouze	Kurnool
Harichall	Cuttack (Orissa)
Jahaji kol	Goalpara (Assam)
Kabul bale	Udipi (South Kanara)
Kabuli	Cuttack (Orissa)
Kandi vazhai	Tiruchirappalli
Kari vazhai	Aravenu (Nilgiris)
Kooli vazhai	Erode (Coimbatore) ; Karur (Tiruchirappalli)
Kooni vazhai	Kulittalai (Tiruchirappalli)
Kuli vazhai	Mayuram (Tanjore) ; Kulittalai (Tiruchirappalli) ; Neyyattinkara (Travancore)
Kullan	Mettupalayam (Coimbatore) ; Kollecombe (Nilgiris)
Kulla vazhai	Coonoor (Nilgiris) ; Mettupalayam (Coimbatore)
Kutta vazhai	Tiruchirappalli
Kuttaththi vazha	Varkala (Travancore)
Kuzhi nendran	Trichur (Cochin)
Mauritius	Cuttack (Orissa)
Morris vazhai	Tenkasi, Palamcottah (Tirunelveli) ; Peermede (Travancore) ; Villupuram (South Arcot)
Nila mutti	South India
Nila vazhai	Kulittalai (Tiruchirappalli)
Pacha aratti	Kodur, Pulivendla (Cuddapah) ; Kavali, Jagadevipet (Nellore) ; Tambalapalle, Tirupathi (Chittoor) ; Bhimadole (Godavari) ; Kalava (Kurnool) ; Rampuram (Bellary)
Pacha bale	Bangalore
Pacha vazhai (or wara)	Tiruchirappalli ; Gudiyatham, Vellore (North Arcot) ; Anantapur ; Cuddalore (South Arcot) ; Sadras, Tiruvallur (Chingleput)

1 VAMANAKELI—*cont.*	
Pisang serandah	Malaya
Vahana aratti	Chellappalle (Krishna)
Vamana aratti	Jagarlamudi, Nidubrolu (Guntur)
Vamana chakkarakeli	Samalkot (Godavari)
Vamanakeli	Visakhapatnam ; Samalkot (Godavari)
Wet-ma-lut	Burma
2 GIANT GOVERNOR—	
Giant Governor	Trinidad (West Indies)
Mhuskela	Kirkee (Bombay)
3 PEDDA PACHA ARATTI—	
Malbhog	Cuttack (Orissa)
Pacha vazha neeththal	Sadras (Chingleput)
Pedda pacha aratti	Kalava (Kurnool)
4 NENDRAN—	
Chengazhi kodan	Trichur (Cochin)
Eththakka	Alwaye (Travancore)
Horn plantain	Foreign
Kal eththan	Neyyattinkara (Travancore)
Nana nendran	Manantoddy, Kongad ; Ponnani (Malabar) ; Moodabidri, Coondapoor (South Kanara); Virajpet (Coorg)
Nicaragua	Foreign
Nendran	Kalpetta, Kurumathur, Kozhikode (Malabar) ; Kasaragod (South Kanara)
Pindi eththan	Chirairambu (Travancore)
Pisang tandok (or *talan*)	Malaya
Thiruvodan	Tellicherry (Malabar)
Thiruvonan	Do.
(1) *Forma* KALIETHTHAN—	
Kalieththan	Chirairambu (Travancore)
Vaali eththan	Neyyattinkara (Travancore)
(2) *Forma* ELERI—	
Anaikomban	Sadras (Chingleput)
Attu nendran	Nilambur, Kongad (Malabar)
Eleri	Chirairambu (Travancore)
Nedu nendran	Trichur (Cochin)
Nendra bale	Puthur, Mangalore, Moodabidri (South Kanara)
Nendran	Rajahmundry (Godavari); Mayuram (Tanjore) ; Cuddalore (South Arcot); Tiruvallur (Chingleput)
Nendra vazha	Tellicherry, Kozhikode (Malabar)
Then vazhai	Ballampadugai (South Arcot)
Yeththan	Sendamaram, Vallioor (Tirunelveli)

4 NENDRAN—*cont.*	
(3) *Forma* KALETHTHAN—	
Kaleththan	Chirairambu (Travancore)
(4) VELATHTHAN—	
Velaththan	Chirairambu (Travancore)
(5) MYNDOLI—	
Myndoli	Mangalore (South Kanara); Trichur (Cochin); Alwaye (Travancore)
(6) MOONGIL—	
Moongil	Neyyattinkara (Travancore)
Otta mukil	Trichur (Cochin)
Pisang tando	Malaya
Singapuri	Cuttack (Orissa)
5 CHINGAN—	
Chinga bale	Mangalore, Puthur (South Kanara)
Chingan	Kongad, Nilambur, Ponnani (Malabar); Trichur (Cochin)
Nachchingan	Nedumangad (Travancore)
Pachcha chingan	Kozhencheri, Kottayam (Travancore)
Forma MAANIYILLA CHINGAN—	
Maaniyilla chingan	Kozhencheri (Travancore)
6 ETHTHA CHINGAN—	
Eththa chingan	Kozhencheri (Travancore)
7 CHINALI—	
China	Neyyattinkara (Travancore)
Chinari	Trichur (Cochin)
8 KAIO—	
Kaio	Honolulu (Hawaii)
9 KADALI—	
Devan or *Devar Kadali*	Kuthuparamba (Malabar)
Kadali (or *Caduli*)	Tellicherry, Kalpetta, Nilambur and Ponnani (Malabar); Trichur (Cochin); Trivandrum and Peermede (Travancore)
Ney kadali	Kasargod (South Kanara)
Nivedya kadali	Kottayam (Travancore)
Poovan kadali	Kongad (Malabar)
Vella kadali	Ponnani (Malabar)
10 SURYA KADALI—	
Australian	Kumaranallur (Malabar); Trichur (Cochin)
Klui ferong or *kai*	Siam
Pisang maas	Malaya
Surya kadali	Kozhikode (Malabar); Trichur (Cochin)
11 MATTI—	
Matti	Nagercoil (Travancore)

12 NAMARAI—

Namarai	Pannakkadu (Madurai) Sirumalais (Madurai)

13 AANAIKOMBAN—

Aanaikomban	Coimbatore, Mettupalayam and Pollachi (Coimbatore); Malli (Tirunelveli); Kollacombe (Nilgiris)
Aattukomban	Pannakkadu (Madurai)
Haavu bale	Bangalore
Hathi kela	Chattikona summit (Visakhapatnam)
Kadali	Muttanandal (Ramanathapuram)
Kombu bale	Arevenu (Nilgiris)
Komma aratti	Piridi; Simhachalam; Parvathipuram (Visakhapatnam)
Madras bale	Kampli (Bellary)
Mohan bansi	Cuttack (Orissa)
Moonginsing	Chattikona summit (Visakhapatnam)
Naga bale	Bangalore
Pacha naadan	Malli, Sendamaram (Tirunelveli)
Pacha vazhai	Malli (Tirunelveli)

14 KARIM KADALI—

Aanai komban	Kulittalai (Tiruchirappalli)
Chodari	Kuthuparamba (Malabar)
Irachchi kai	Kuthuparamba; Kurumathur (Malabar)
Irachchi ketti kai	Kuthuparamba (Malabar)
Karim kadali	Trichur (Cochin); Alwaye, Neyyattinkara, Peermede (Travancore)
Kari vazha	Nilambur, Manjeri (Malabar)
Vettan	Manantoddy, Kalpatta (Malabar); Gudalur (Nilgiris)
Yerchi bale	Bhagamandla (Coorg)

15 GROS MICHEL—

Anamalu	Ceylon
Blue Field	Honolulu (Hawaii)
Figue-la-rose	Foreign
Gros Michel	Trinidad (West Indies)
Jamaica banana	Foreign
Klui-hom	Siam
Martinique	Foreign
Pisang bunga	Malaya (in Penang)
Pisang embon	Malaya
Pisang hijau	Malaya
Pisang masak hijau.	Malaya (a sub-acid form)
Thihmwe	Burma

16 CHAKKARAKELI—

Aa bale	Virajpet (Coorg)
Chakerkelli	Cuttack (Orissa)

16 CHAKKARAKELI—*cont.*	
Chakkarakadali	Trichur (Cochin)
Chakkarakeli	Jayadevipet (Nellore); Chellapalle (Krishna); Anantapur, Rajahmundry (Godavari); Kampli (Bellary); Parvathipuram (Visakhapatnam); Tambalapalle (Chittoor); Coimbatore; Cuttack (Orissa)
Ezhuththani	Neyyattinkara, Nedumangad (Travancore)
Godaveri chakkarakeli	Piridı (Visakhapatnam)
Kari vazhai	Tiruchirappalli
Manchi chakkarakeli.	Nidubrolu (Guntur)
Mysore poovan	Mundakayam (Travancore)
Mysore rasthali	Mettupalayam (Coimbatore)
Pedda chakkarakeli.	Siruvalanka (Krishna)
Raja bale	Bangalore, Virajpet (Coorg)
Raja kili	Sadras (Chingleput)
Raja vazhai	Gudiyattam (North Arcot); Mettupalayam (Coimbatore); Tiruchirappalli
Rasthali	Srivilliputhur, Tenkasi (Tirunelveli)
Saja aratti	Simhachalam (Visakhapatnam)
Sahaja	Panchadarala (Visakhapatnam)
Thella chakkarakeli.	Samalkot (Godavari); Nidubrolu, Masulipatnam (Krishna); Kalahasti (Chittoor)
Thean kadali	Erode (Coimbatore)
Ecotype Raja Vazhai—	
Raja vazhai	Kulittalai (Tiruchirappalli)
17 NALLA CHAKKARAKELI—	
Kari vazhai	Kampli (Bellary)
Nalla chakkarakeli.	Palteru (Visakhapatnam)
Nalla mokri	Parvathipuram (Visakhapatnam)
18 KARI VAZHAI—	
Kari vazhai	Erode (Coimbatore).; Kulittalai (Tiruchirappalli)
Pachai	Sendamaram (Tirunelveli)
Ecotype Manoranjitham—	
Manoranjitham	Tiruchirappalli
19 CHENKADALI—	
Beet java	Cuttack (Orissa)
Cambur morado	Venezuela
Chandra bale	Bhagamandala (Coorg); Bangalore; Moodbidri, Mangalore (South Kanara)
Chenkadali	Kozhikode, Kalpetta, Manjeri (Malabar); Trichur (Cochin); Cuddalore (South Arcot); Quilon (Travancore)
Chev (Tam.)	Peradeynia (Ceylon)

19 CHENKADALI—*cont.*

Chevvazhai	Coonoor, Gudalur, Kollacombe (Nilgiris); Mettupalayam, Erode, Pollachi (Coimbatore); Pannakadu, Sirumalai (Madurai); Tenkasi, Ambasamudram (Tirunelveli); Sadras (Chingleput); Gudiyattam (North Arcot); Kottarakara (Travancore); Mayuram (Tanjore).
Chontha bale	Virajpet (Coorg)
Chora kadali	Tellicherry (Malabar)
Chora poovan	Alwaye (Travancore)
Chuvanna kappa	Varkalai (Travancore)
Chuvanna chevvazhai	Quilon (Travancore)
Kappa	Neyyattinkara, Kottarakara (Travancore)
Karim kadali	Kalpetta (Malabar)
Kempu bale	Rampuram (Bellary)
Klui naak	Siam
Kunkuma bale	Kampli (Bellary)
Lal kel (Lal-kela)	Kallar (Coimbatore)
Lal mouze	Kurnool
Malam poovan	Peermede (Travancore)
Pisang rajah udang	Malaya
Raktha kadali	Kottayam (Travancore)
Ratembala	Peradeynia (Ceylon)
Red	Kirkee (Bombay)
Sakalathi bale	Mercara (Coorg); Palhalli (Mysore)
Shwe-hunget-pyaw	Burma
Velchi	Bombay
Yerra aratti	Allipuram (Nellore); Kalava (Kurnool); Piridi (Visakhapatnam); Rajahmundry (Godavari); Tambalapalee (Chittoor)
Yerra chakkarakeli	Bhimadole (West Godavari); Chellapalli (Krishna)
Yerra mokiri	Panchadarla (Visakhapatnam)

Forma VENKADALI—

Blay suganthi	Rampuram (Bellary)
Chevvazhai	Gudalur (Nilgiris)
Chora poovan	Alwaye (Travancore)
Elakki bale	Mercara (Coorg)
Green red	Foreign
Kappurapa keli	Simhachalam (Visakhapatnam)
Karim kadali	Manantoddy, Kongad (Malabar)
Kari vazhai	Mettupalayam (Coimbatore)
Karpurapu keli	Panchadarala (Visakhapatnam)
Malam poovan	Kottarakara, Peermede (Travancore)
Marthamalu	Ceylon
Ney vazhai	Pannakadu (Madurai)

19 CHENKADALI—*cont.*

Forma VENKADALI—*cont.*

Pacha chevvazhai	Benhope, Burliar (Nilgiris)
Pacha kadali	Virajpet (Coorg)
Pacha vettan	Neyyatinkara (Travancore)
Randavarakam chakkarakeli	Chellapalli (Krishna)
Thekkan poovan	Ponnani (Malabar)
Thuluvan	Nagercoil (Travancore)
Vella chevvazhai	Quilon (Travancore)
Vella kadali	Manantoddy (Malabar)
Vella kappa	Varkalai (Travancore)
Vella poovan	Manantoddy (Malabar)
Vella vazhai	Tenkasi, Courtallam (Tirunelveli)
Velutha chen kadali.	Trichur (Cochin)
Venkadali	Kalpetta ; Perintalmanna (Malabar)
White claret	Foreign

20 SANNA CHENKADALI—

Lal kel	Kallar (Coimbatore)

21 RASTHALI—

Aana poovan	Kurumathur (Malabar)
Amirthapani	Palteru (Godavari) ; Bhimadole (West Godavari) ; Chellapalli (Krishna)
Ari poovan	Nilambur (Malabar)
Bengala	Kodur (Cuddapah)
Blay suganthi	Hospet (Bellary)
Buttam	Nagpur (Central Province)
Desi	Gopalpur (Ganjam)
Ellaichi	Nagpur (Central Province)
Hoo bale	Moodbidri (South Kanara)
Htaw-bat	(Burma)
Jalakonda mokiri	Orissa
Karkandu vazhai	Sendamaram (Tirunelveli)
Karpura chakkarakeli	Chellapalli (Krishna)
Kolikuttu	Peradeniya (Ceylon)
Kothia	Cuttack (Orissa)
Malbhog kola	Goalpara (Assam)
Mokiri	Piridi (Visakhapatnam) ; Samalkot (Godavari)
Nanjangud rasabale.	Jayachamarajapuram (Mysore) ; Bangalore
Nattu poovan	Ponnani (Malabar) ; Pollachi (Coimbatore) ; Trichur (Cochin)
Nattu thuluvan	Nagercoil (Travancore)
Pallu	Gopalpur (Ganjam)
Parangi	Peradeniya (Ceylon)
Patkapura	Cuttack (Orissa)
Pedda suganthan	Giddalur (Kurnool)

21 RASTHALI—*cont.*	
Poo bale	Moodbidri, Udipi (South Kanara)
Poo suganthi	Hospet (Bellary)
Poovan (*or Puam*)	Tellicherry ; Manantoddy ; Nilambur and Kongad (Malabar) ; Nagercoil, Kottayam and Alwaye (Travancore) ; Pollachi (Coimbatore) ; Gudalur (Nilgiris) ; Tenkasi (Tirunelveli)
Rasa bale	Udipi and Coondapoor (South Kanara) ; Virajpet and Bhaghamandala (Coorg) ; Ramapuram (Bellary) ; Anantapoor and Kyasandra (Mysore)
Rasthali	Erode and Mettupalayam (Coimbatore) ; Karur and Trichy. (Tiruchirappalli) ; Mayuram (Tanjore) ; Vellore (North Arcot) ; Cuddalore and Chidambaram (South Arcot) ; Sadras and Tiruvallur (Chingleput) ; Kalava (Kurnool) ; Allipuram (Nellore) ; Tissayanvilai (Tirunelveli) ; Tirupati and Kalahasti (Chittoor)
Silk	Foreign
Siruguppa bale	Hospet (Bellary)
Sonkela (*Son-kel*)	Nagpur (Central Province)
Sugantha	Pulivandala (Cuddapah) ; Jagadevipet (Nellore)
Sugantham	Sidhout (Cuddapah)
Suganthi	Tirupati (Chittoor)
Thella mokiri	Panchadarala (Visakhapatnam)
Thuluvan	Nagercoil (Travancore)
Ullur poovan	Coimbatore
Forma AYIRANKA RASTHALI—	
Ayiram kuchchi	Sadras (Chingleput)
Ayiram poovan	Kozhikode and Nilambur (Malabar)
Ayiram ka poovan	Pollachi (Coimbatore) ; Trichur (Cochin)
Guindy	Foreign
Poovilla konai	Pollachi (Coimbatore)
Poovodiya vazhai	Sadras (Chingleput)
Veyyikai aratti	Tirupathi and Kalahasti (Chittoor)
22 SUGANTHI—	
Puttu bale	Benhope (Nilgiris)
Suganthi	Kampli and Siruguppa (Belary)
23 NEY POOVAN—	
Adakka poovan	Kuthuparamba (Malabar)
Ari poovan	Ponnani (Malabar)
Deva bale	Moodbidri (South Kanara)
Hoo bale	Coondapoor (South Kanara) ; Ambuga (Mysore)
Elakki bale	Nanjangud, Bangalore (Mysore)

23 NEY POOVAN—*cont.*

Kadali	Kongad (Malabar); Mangalore and Moodbidri (South Kanara); Bhagamandla (Coorg)
Kadali poovan	Kumaranallur (Malabar)
Kannan poon kadali.	Nagercoil (Travancore)
Karpurapu aratti	Tambalapalle (Chittoor)
Kunnan poovan	Kalpetta (Malabar)
Madhura annaan	Edakkode (Travancore)
Mysore rasthali	Kallar (Coimbatore)
Ney kadali	Puttur (South Kanara)
Ney poovan	Tellicherry and Ponnani (Malabar)
Nhali poovan	Ponnani (Malabar); Kottarakara, Peermede and Alwaye (Travancore)
Nhani poovan	Nileshwar (South Kanara); Nilamel and Kottayam (Travancore)
poo bale	Mercara and Ponnampet (Coorg)
Poovan kadali	Kumaranallur (Malabar)
Puttu bale	Udipi Coondapur (South Kanara); Kyatchandra, Jayachamarajapur (Mysore)
Puttu sugantha	Kyatsandra (Mysore)
Raja bale	Rampuram (Bellary)
Rasadala	Madanapalle (Chittoor)
Rasakadali	Tellicherry and Kuthuparamba (Malabar); Nagercoil and Quilon (Travancore)
Sufed velchi	Kirkee (Bombay)
Sugantham	Bangalore
Thekkan kadali	Manantoddy and Kurumathur (Malabar)
Thirunelli poovan	Kozhikode and Kumaranallur (Malabar)
Thulunattu kadali.	Nedumangad (Travancore)
Vadakkan kadali	Trichur (Cochin State)
Velchi	Kallar (Coimbatore)

24 POOVAN—

Adukku namarai	Pannakkadu and Sirumalai (Madurai)
Bengala	Bangalore, Nellore, Cuddalore (South Arcot); Tirupathi (Chittoor)
Chakkarakeli	Velpur and Kandavalli (West Godavari)
Cheena bale	Bangalore
Cherukai	Alwaye (Travancore)
Dorai vazhai	Coonoor (Nilgiris); Mettupalayam (Coimbatore)
Embul hondarawala.	Peradeynia (Ceylon)
Erode poovan	Coimbatore
Ginni	Rajamundry (Godavari); Parvathipuram, Simhachalam (Visakhapatnam)
Huli bale	Ambuga and Hassan (Mysore)
Kadali	Tirunelveli, Madurai and Ramanathapuram

24 Poovan—*cont.*

Kallattu vazhai	Mettupalayam (Coimbatore)
Kari bale	Palhalli (Mysore)
Kari goddi	Chennapatnam (Mysore)
Kari puttu bale	Jayachamarajapura (Mysore)
Kari rasa bale	Kyatsandra (Mysore)
Kari vazhai	Mettupalayam (Coimbatore)
Karpura	Peravali (Godavari)
Karpura chakkarakeli	Godavari, Visakhapatnam and Masulipatnam (Krishna); Kalahasti (Chittoor)
Korangu vazhai	Pollachi (Coimbatore)
Lal velchi	Kirkee (Bombay)
Mysore	Mangalore and Kasargod (South Kanara); Tellicherry (Malabar); Ponnani (Malabar)
Mysore bale	Udipi and Moodbidri (South Kanara); Kowsika (Mysore)
Mysore kadali	Moodbidri (South Kanara); Ponampet and Bhagamandla (Coorg)
Mysore poovan	Nileswar (South Kanara); Manantoddy and Ponnani (Malabar); Gudalur (Nilgiris)
Mysori	Kumaranallur (Malabar)
Nanjangud bale	Ambuga (Mysore)
Navarai	Madurantakam (Chingleput)
Othu rasa bale	Nagavalli (Mysore)
Palayankodan (*Palayangodan*) (*Palayanthodan*)	Peruvamba (Malabar); Trichur (Cochin); Nagercoil, Quilon and Alwaye (Travancore)
Pisang brok bakul	Malaya
Poovan	Tiruchirappalli district, Tanjore district, South Arcot district and Coimbatore district
Poo vazhai	Coonoor (Nilgiris); Vellore and Gudiyatham (North Arcot)
Pulichan kadali	Thissayanvilai (Tirunelveli)
Pulippu kai	Pollachi (Coimbatore)
Puwalu	Ceylon
Rasa bale	Hospet (Bellary)
Rasthali	Chellapalli (Krishna); Tirupathi (Chittoor)
Salem	Hospet and Kampli (Bellary)
Soan mouze	Kurnool
Sugandha	Chagalma (Kurnool)
Sugandhi	Rampuram, Hampi (Bellary)
Sugandham	Kalava, Cumbum (Kurnool); Proddatur (Cuddapah)
Vasana chettu	Gopalpur (Ganjam)

24 POOVAN—*cont.*

Vilayithi bale	Kowsika (Mysore)
Yerra aratti	Godugumuru (Chittoor)
Yerra sugantham	Guddalur (Kurnool)

(*a*) *Forma* MOTTA POOVAN—

Motta poovan	Aduturai (Tanjore)
	Coimbatore

25 THIRUVANANTHAPURAM—

Thiruvananthapuram.	Trichur (Cochin)

26 KULLAN—

Aana guja bale	Bangalore
Chakkarakeli	Guntur
Kullan	Coimbatore
Kuzhi vazhai	Udamalpet (Coimbatore)
Rasa arati	Peddapur (East Godavari)
Ther vazhai	Erode (Coimbatore)
Wala	Kirkee (Bombay)
Yenuga aratti	Madanapalle and Tambalapalle (Chittoor)

27 NENDRA PADATHTHI—

Kuthiravalan	Pulamanthal (Malabar)
Nendra padaththi	Trichur (Cochin)
Nendra vannan	Trichur (Cochin)

28 PACHA NADAN—

Belli baja	Aravenu (Nilgiris)
Bengala	Jayadvipet (Nellore)
Chakkarakeli	Proddatur (Cuddapah)
Cheruvannan	Pattambi (Malabar)
Chingan	Nagercoil (Travancore)
Dorai vazhai	Aravenu (Nilgiris)
Eradan	Perintalmanna (Malabar) Trichur (Cochin)
Erode Naadan	Pallapalayam (Coimbatore)
Kadali	Mayuram (Tanjore)
Kali	Tiruchirappalli (Tanjore); Koshencheri (Travancore); Cuddalore (South Arcot); Pollachi (Coimbatore)
Kalkadali	Srivilliputtur (Ramanathapuram)
Konda arati	Rampuram (Bellary)
Korangu laadan	Coonoor (Nilgiris)
Laadan	Mettupalayam (Coimbatore); Coonoor (Nilgiris)
Ladda	Kotagiri (Nilgiris)
Malabar	Parvathipuram (Visakhapatnam)
Mannan	Kozhikode (Malabar)
Nadan	Pallapalayam (Coimbatore)
Naattu chingan	Nagercoil (Travancore)

28 PACHA NADAN—*cont.*

Pacha arati	Nidubrolu (Krishna); Cumbum (Kurnool)
Pacha laadan	Hampi (Bellary); Kulitalai (Tiruchirappalli); Kallakurichi (South Arcot)
Pacha naadan	Mettupalayam, Erode and Udamalpet (Coimbatore); Kalava (Kurnool); Cuddalore (South Arcot); Nagapattinam
Pacha naala	Thirumalai hills (Chittoor)
Pacha vazhai	Pollachi (Coimbatore)
Padaththi	Alwaye and Nagercoil (Travancore)
Poo vazhai	Kollecombe (Nilgiris)
Thekkan mannan	Kurumathur (Malabar)
Thodan	Nilambur and Perintalmanna (Malabar)
Uduran	Ikkadu (Chingleput)
Vannan	Kozhikode (Malabar)
Vella padan	Do.

29 KAALI—

Cheena bale	Bangalore
Chingan	Vallioor (Tirunelveli); Nagercoil and Eddakode (Travancore)
Elakki bale	Kowsika and Jodikyathanahelli (Mysore)
Gali bale	Moodbidri and Mangalore (South Kanara); Bhaghamandala (Coorg)
Janaka bale	Udipi (South Kanara)
Kaadu bale	Nanjangud and Gundlupet (Mysore)
Kal bale	Chicknayakkanahalli (Mysore)
Kai bale	Nagavalli (Mysore)
Kaali	Kongad and Pulamanthol (Malabar)
Kaattu bale	Udipi and Mangalore (South Kanara)
Kaattu kai	Kasaragod (South Kanara)
Kuppa mannan	Nileswar (South Kanara)
Kaayi vala	Gudalur (Nilgiris)
Mannan	Manantoddy and Kalpetta (Malabar); Nileshwar (South Kanara); Varkala (Travancore)
Mara bale	Mercara and Virajpet (Coorg)
Nattu mannan	Tellicherry (Malabar)
Pacha arati	Godagumuru (Chittoor)
Pacha bale	Bangalore
Pacha nadan	Thisiyanvilai (Tirunelveli)
Padachchi kai	Alwaye (Travancore)
Padalu	Kumaranallur and Peruvemba (Malabar)
Padaththi	Nanguneri (Tirunelveli); Peruvemba Malabar); Nagercoil, Quilon and Peermade (Travancore)
Pada vazhai	Gudalur (Nilgiris)
Pakki	Do.

29 KAALI—*cont.*	
Potta kali	Peruntalmanna and Kongad (Malabar)
Thodan	Quilon (Travancore)
Thotta arati	Godugumuru (Chittoor)
Vannan	Kalpetta (Malabar)
Vellai chingan	Sankarankoil and Courtallam (Tiruneveli)
Vella padan	Gudalur (Nilgiris)
30 VANNAN—	
Cheru vannan	Pattambi (Malabar)
Dacca Martaban	Cuttack (Orissa)
Embul hondarawala.	Peradeynia (Ceylon)
Ethara vazhai	Thangachimadam (Ramanathapuram)
Kaadu bale	Palhalli (Mysore)
Kaali thodan	Nilambur (Malabar)
Kaali vazhai	Triruchirappalli
Katta kaali	Do.
Korangu naadan	Erode (Coimbatore)
Korangu pacha ladan.	Tiruchirappalli
Kozhikkootu vazhai.	Tangachimadam (Ramanathapuram)
Ladan	Coonoor, Kallar and Benhope (Nilgiris)
Mala vazhai	Tiruchirappalli
Mundila paadan	Nilambur (Malabar)
Mundi vellapaadan	Manjeri (Malabar)
Pacha laadan	Tanjore
Padalu	Ponnani (Malabar)
Poo valai (Tam.)	Peradeynia (Ceylon)
Puwalu	Do.
Sugantham	Madanapalle (Chittoor)
Tenkasi mala vazhai.	Bramadesam (Tirunelveli)
Udiran	Thirupathi (Chittoor)
Udiri	Sankarankoil (Tirunelveli)
Valia thodan	Nilambur (Malabar)
Vannan	Kongad and Ponnani (Malabar); Trichur (Cochin)
Vannan eradan	Trichur (Cochin)
Vannan kaali	Do.
Watupalu	Peradeynia (Ceylon)
VANNAN ECOTYPE—	
(1) *Virupakshi*—	
Vella vazhai	Pannakkadu (Madurai)
Virupakshi	Palni Hills (Madurai)
ECOTYPE—	
(2) *Sirumalai*—	
Mala vazhai	Nagapattinam (Tanjore); Tenkasi (Tirunelveli); Madurantakam (Chingleput)
Sirumalai	Sirumalais (Madurai)
Uduran vazhai	Do.
31 KAPUR—	
Bangalore aratti	Rajahmundry (Godavari)
Janaka bale	Udipi (South Kanara)

31 KAPUR—*cont.*	
Kapur bale	Mangalore and Coondapur (South Kanara)
Sal datti	Mangalore
Ecotype, APPLE	Honolulu (Hawaii) Coimbatore
32 KRISHNA VAGHAI—	
Kari vazhai	Kallar (Coimbatore); Thangachimadam (Ramanathapuram); Sirumalais (Madurai) and Benhope (Nilgiris)
33 KUNNAN—	
Adukkan (*Adukkvan*)	Tellicherry and Kurumathur (Malabar)
Adukkupoovan	Nileshwar (South Kanara)
Amirthapani	Siruvalanka (Krishna)
Annaan	Neyyatinkara, Nedumangad (Travancore)
Chakkarakeli	Visakhapatnam
Chinna sugantham	Giddalur (Kurnool)
Chitti bale	Kampli (Bellary)
Ginni	Samalkot (Godavari); Chattikona summit (Visakhapatnam)
Jirika bale	Kallamendkur (South Kanara)
Kannan	Quilon, Kozhencheri and Alwaye (Travancore)
Karpura chakkarakeli	Chellapalle (Krishna)
Kulamel kula	Kasaragod (South Kanara)
Kunnan	Kozhikode, Kongad, Nilambur and Ponnani (Malabar); Gudalur (Nilgiris)
Madras arati	Piridi (Visakhapatnam)
Naadan kunnan	Perintalmanna (Malabar)
Naar kadali	Sendamaram (Tirunelveli)
Neechu	Kandavalli (West Godavari)
Poong kadali	Nagercoil (Travancore)
Potti mokiri	Orissa
Sanna aakulu chettu	Nidubrolu (Krishna)
Sudha	Orissa
Sugantha	Musanur (Nellore)
Tirunolli kadali	Kasaragod (South Kanara)
Valia kunnan	Trichur (Cochin)
Vellai kadali	Sankarankoil (Tirunelveli)
Type AYIRAM KUNNAN—	
Ayiram kunnan	Nilambur (Malabar)
34 VENNEETTU KUNNAN—	
Samba poongkadali	Nagercoil (Travancore)
Venneettu kunnan	Kozhikode (Malabar)

35 ADAKKA KUNNAN—

Adakka kunnan	Kongad (Malabar)
Chara kunnan	Do.
Cheru kunnan	Trichur (Cochin)
De kunnan	Manjeri (Malabar)
Mundi kunnan	Pulamanthol (Malabar)
Mutti kunnan	Perintalmanna (Malabar)
Pakada kunnan	Kongad (Malabar)
Samba kannan	Kozhencherri (Travancore)
Venneer kunnan	Pulamanthol and Perintalmanna (Malabar)

36 THEAN KUNNAN—

Kunnan	Ponnani (Malabar)
Poong kadali	Thisiyanvilai (Tirunelveli)
Poovilla vazhai	Mayuram (Tanjore)
Thean kunnan	Kongad and Perintalmanna (Malabar)

Forma THATTILLA KUNNAN—

Benda arati	Piridi (Visakhapatnam)
Chitrachalam	Rajahmundry (Godavari)
Chundilla kannan	Kottayam and Peermade (Travancore)
Chundillan	Peermade (Travancore)
Godavari keli	Visakhapatnam
Kaththe bale	Bangalore
Kodapanilla kunnan.	Tirchur (Cochin)
Koombilla annaan	Varkala (Travancore)
Koombilla chingan	Nagercoil (Travancore)
Koombilla ka	Neyyattinkara (Travancore)
Koombilla kannan	Kottarakara and Kozhencherri (Travancore)
Koombilla poovan	Kuthuparamba (Malabar)
Mambilla	Kasaragod (South Kanara)
Mambilla kunnan	Kozhikode (Malabar)
Mambilla poovan	Kuthuparamba (Malabar)
Maniyilla kunnan	Ponnani and Kongad (Malabar)
Poola chundan	Tenkasi and Sendamaram (Tirunelveli)
Poo vazhai	Sadras (Chingleput)
Poovilla vazhai	Kallar (Coimbatore) and Cuddalore (South Arcot)
Rundu bale	Mangalore and Moodabidri (South Kanara)
Suwandel	Peradenia (Ceylon)
Thattilla kunnan	Kozhikode, Nilambur and Ponnani (Malabar) and Quilon (Travancore)

37 PEYAN—

Booditha arati	Godugumuru (Chittoor)
Kotta vazhai	Tanjore
Ney vannan	Kumaranallur (Malabar)
Ney vazha	Peruvemba (Malabar)

37 PEYAN—*cont.*

Nokala bontha	Simhachalam and Isikkilands (Visakhapatnam)
Palakala bontha	Samalkot (Godavari)
Peyan	Chingleput, Tanjore and South Arcot
Pey valam	Chellapalle (Krishna); Rajahmundry (Godavari) and Vellatur near Bhattiprolu (Guntur)
Rasthali	Siruvalanka (Krishna)
Sapota bontha	Samalkot (Godavari); Parvatipuram (Visakhapatnam) and Peddapur (Godavari)
Savargundy	Mettupalayam and Kallar (Coimbatore)

38 PEY LAADAN—

Ladan	Kulittalai (Tiruchirappalli)
Mada vazhai	Erode (Coimbatore) and Karur (Tiruchirappalli)
Manua kola	Goalpara (Assam)
Maharam vazhai	Manathattai (Tiruchirappalli)
Peyan	Erode (Coimbatore)
Pey ladan	Kulittalai (Tiruchirappalli)
Pey monthan	Tiruchirappalli
Pey vazhai	Do.
Pidi monthan	Kallakkurichi (South Arcot)

Forma MAYIL VAZHAI—

Mayil vazhai	Anuppanadi (Madurai) and Muttanandal (Ramanathapuram)
Morris vazhai	Udamalpet (Coimbatore)

39 BOOTHI BALE—

Bonha bale	Mangalore and Moodabidri (South Kanara)
Boothi bale	Mangalore and Puttur (South Kanara); Veerajpet (Coorg) and Chickkanayakanahalli and Kowsika (Mysore)
Gobra bale	Mangalore (South Kanara)
Onakkan mannan	Nileshwar (South Kanara)
Venneettan	Kurumathur (Malabar)

40 KOSTHA BONTHA—

Karpura vazhai	Kancheepuram and Andarkuppam (Chingleput)
Kostha bontha	Palteru (Visakhapatnam)
Manua kola	Goalpara (Assam)
Raja vazhai	Palambakkam (Chingleput)

41 PEY KUNNAN—

Awak legor	Trichur (Cochin)
Sambrani	Yercaud (Salem)

42 ENNA BENIAN—

Enna benian	Pallur (North Arcot)

43	NEY MANNAN—	
	Alukehel ...	... Peradeniya (Ceylon)
	Bhysi mowze	... Kurnool
	Chara kaali	... Quilon (Travancore)
	Chathura kaali	... Varkala (Travancore)
	Cherathali ...	... Kottarakara (Travancore)
	Chinna monthan	... Madurai
	Iyyan mannan	... Tellicherry (Malabar)
	Javari ...	... Hospet (Bellary)
	Kallu vannan	... Kozhikode (Malabar)
	Kamalapuram	... Kalava (Kurnool)
	Kari bale ...	... Rampuram (Bellary)
	Malamundi	... Nilambur and Manjeri (Malabar)
	Mendhi bantal	... Cuttack (Orissa)
	Nattu vazhai	... Sivakasi, Palayamkottai and Tuticorin (Tirunelveli) and Srivilliputtur (Ramanathapuram); Kochadai and Pannakkadu (Madurai)
	Ney vannan	... Kongad and Ponnani (Malabar) and Trichur (Cochin)
	Padinharan	... Perintalmanna (Malabar)
	Peyan ...	... Nanguneri (Tirunelveli); Thangachimadam (Ramanathapuram); Nagercoil and Alwaye (Travancore)
	Pey monthan	... Neyyattinkara (Travancore)
	Theeyan mannan	... Tellicherry (Malabar)
	Thecifan vazhai	... Do.
	Vayakkattu kai	... Dindigul (Madurai)
	Vayal vazhai	... Palni and Achampattu (Madurai); Sankarankoil and Tenkasi (Tirunelveli); Udamalpet and Pollachi (Coimbatore)
44	VENNEETTU MANNAN—	
	Alukehel ...	... Peradenia (Ceylon)
	Boodithi ...	... Kurnool
	Boothi bale ...	... Rampuram (Bellary)
	Boothi javari	... Kampli (Bellary)
	Charakali ...	... Kottayam (Travancore)
	Peyan ...	... Palayamkottai (Tirunelveli)
	Samba vazhai	... Muttanandal and Malli (Ramanathapuram) and Kochadai (Madurai); (Tirunelveli)
	Sambal (Tam.)	... Peradeniya (Ceylon)
	Venneettu mannan ...	... Nileshwar (South Kanara) and Pattambi (Malabar)
	Venneettu vannan	... Pulamanthol (Malabar)
45	MONTHAN—	
	Akku bale ...	... Bangalore
	Aunda bale ...	... Moodbidri and Mangalore (South Kanara)
	Banga bale ...	... Udipi and Mangalore (South Kanara)

45 MONTHAN—*cont.*

Basthi	Butchireddipalayam (Nellore)
Bhainsa-kela or *Bhainsu.*	Nagpur (Central Province)
Bontha	Kalava and Mahanandi (Kurnool) and Guntur
Chetti kai	Ponnani and Kumaranallur (Malabar); Trichur (Cochin) and Alwaye (Travancore)
Erode bonthan	Pudupatnam (Chingleput)
Erode monthan	Karur and Kulitalai (Tiruchirappalli)
Erode vazhai	Vellore and Arkonam (North Arcot); Polambakkam and Chunampet (Chingleput)
Kalyana bale	Jayachamarajapura and Ambuga (Mysore); Hospet and Kampli (Bellary)
Kari bale	Virajpet and Mercara (Coorg)
Kilandi	Udipi (South Kanara)
Kondai monthan	Tiruchirappalli
Konga bale	Channapatna (Mysore)
Kuppakkaali	Kottayam (Travancore)
Manaattu monthan.	Tenkasi and Courtallam (Tirunelveli)
Madhuranga bale	Bangalore, Gundlepet and Nanjangud (Mysore)
Manga bale	Udipi, Kasaragod and Nileshwar (South Kanara)
Mara bale	Ambuga (Mysore)
Monthan	Udamalpet, Kallar and Coimbatore (Coimbatore); Kochadai (Madurai); Palayamkottai (Tirunelveli); Gudalur (Nilgiris); Tiruvallur (Chingleput); Nagercoil and Kottarakara (Travancore)
Mula monthan	Neyyattinkara (Travancore)
Naathangi monthan.	Erode (Coimbatore)
Nadgangi	Kallakkurichi (South Arcot)
Nattu monthan	Tenkasi (Tirunelveli)
Nielh bontha	Kancheepuram (Chingleput)
Nir bontha	Do.
Pisang nangka	Malaya
Ponnan	Nilambur, Kalpatta and Pattambi (Malabar) and Gudalur (Nilgiris)
Ponthan	Kongad and Peruvemba (Malabar); Quilon and Kottayam (Travancore)
Silanti	Moodbidri (South Kanara)
Sodari	Kurumathur (Malabar)
Thenaali	Kalpatta and Kozhikode (Malabar)
Thezhuthani	Tellicherry and Kalpatta (Malabar)
Thoppul vazhai	Thangachimadam (Ramanathapuram)
Trichinopoly monthan.	Nagapattinam (Tanjore)

45 MONTHAN—*cont.*	
Yendra monthan	Tiruchirappalli
Yenthala monthan	Tanjore
Forma PACHA MONTHA BATHEES—	
Bachees	Nidubrolu (Krishna)
Bathaas	Siddhout and Pulivendla (Cuddapah)
Batheesa	Gopalpur (Ganjam) ; Siruvalanka (Krishna); Jagarlamudi (Guntur) ; Jagadevipet and Kavali (Nellore)
Batisa bontal	Cuttack (Orissa)
Chundi bontha	Atmakur (Nellore)
Gudlur bathees	Musanur (Nellore)
Nalla bathees	Piridi and Palteru (Visakhapatnam)
Nellore bontha	Razampet (Cuddapah)
Pacha bathees	Palteru (Visakhapatnam) ; Samalkot (Godavari)
Pacha bontha bathees.	Visakhapatnam
46 SAMBRANI MONTHAN—	
Bonya kilandi	Udipi (South Kanara)
Booditha arati	Godugumuru (Chittoor)
Boothan kaya	Gudalur (Nilgiris)
Boothi bale	Bangalore and Kyatsandra (Mysore)
Boothi mathuranga.	Palhalli (Mysore)
Monthan Sambrani	Erode (Coimbatore)
Samba monthan	Nagercoil and Neyyattinkara (Travancore)
Vennittu manga	Nileshwar (South Kanara)
Vennittan thezhuthani.	Manantoddy and Kalpatta (Malabar)
Forma BOODITHA MONTHA BATHEES—	
Booditha batheesa	Palteru and Panchadharla (Visakhapatnam) ; Peravali (Godavari)
Booditha bontha bathees.	Visakhapatnam ; Vellatur (Guntur)
Thella bathees	Samalkot (Godavari) ; Piridi (Visakhapatnam); Siruvalanka (Krishna) ; Jagarlamudi (Guntur)
47 NALLA BONTHA—	
Bantal	Cuttack (Orissa)
Bontha	Siddhout and Proddatur (Cuddapah) ; Anantapur ; Madanapalle and Kalahasti (Chittoor) ; Parvathipuram and Chintapalle (Visakhapatnam) ; Bhimadolu and Tanuku (Godavari) ; Nidubrolu and Masulipatnam (Krishna) ; Kavali and Atmakur (Nellore) ; Giddalur (Kurnool) ; Kancheepuram (Chingleput) ; Gudiyattam (North Arcot)

47 NALLA BONTHA—*cont.*

Bontha arati	Kodur (Cuddapah); Tirupathi and Godugumuru (Chittoor)
Bonthan	Sadras, Tiruvallur and Cheyyur (Chingleput); Gudiyattam and Polur (North Arcot)
Chathura monthan.	Erode (Coimbatore)
Kaththe bale	Rampuram and Siruguppa (Bellary)
Katta bontha	Kancheepuram (Chingleput)
Koonthalai	Sirumalais (Madurai)
Koorakayi chettu	Chatikona sumit (Visakhapatnam)
Maanaattu monthan.	Sankarankoil (Tirunelveli)
Monthan	Palambakkam and Kancheepuram (Chingleput); Polur and Modikuppam (North Arcot); Kallakurichi and Cuddalore (South Arcot); Mayuram (Tanjore); Udamalpet (Coimbatore); Aravenu and Kollacombe (Nilgiris); Kochadai (Madurai); Rameswaram (Ramanathapuram); Srivilliputtur and Brahmadesam (Tirunelveli)
Nalla bontha	Piridi and Simhachalam (Visakhapatnam); Chellapalle (Krishna); Jagarlamudi (Guntur)
Naattu ka	Chunampet (Chingleput)
Naattu monthan	Karur and Kulitalai (Tiruchirappalli); Nagapattinam (Tanjore); Villupuram (South Arcot); Vallioor (Tirunelveli)
Pacha bontha	Gopalpur (Ganjam); Palteru (Visakhapatnam); Samalkot (Godavari); Siruvalanka (Krishna); Vellattur (Guntur)
Palakolu bontha	Jagarlamudi (Guntur)
Pedda bontha	Atmakur (Nellore)
Periya bonthan	Pallur (North Arcot)
Sahara monthan	Erode (Coimbatore)
Thezhuthani	Manantoddy (Malabar).
Ullur monthan	Karur (Tiruchirappalli)

Forma NALLA BONTHA BATHEES—

Isika bontha	Jagarlamudi (Guntur)
Pichika bontha	Do.

8 THELLA BONTHA—

Booditha bontha	Gopalpur (Ganjam); Panchadharla and Piridi (Visakhapatnam); Tanuku Samalkot and Rajahmundry (Godavari); Vellatur (Guntur); Musanur (Nellore) Kalahasti (Chittoor)
Sambal bonthan	Sadras (Chingleput); Pallur (North Arcot)

48 THELLA BONTHA—*cont.*	
Sambal vazhai	Tiruvallur and Andarkuppam (Chingleput)
Thella bontha	Palteru and Piridi (Visakhapatnam); Siruvalanka and Challapalle (Krishna); Jagarlamudi (Guntur)
49 KURI BONTHA—	
Katta bonthan	Pallur (North Arcot)
Kuri bontha	Musanur (Nellore)
Pidi bontha	Cheyyur (Chingleput)
50 KALLU MONTHAN—	
Kallu monthan	Kulitalai (Tiruchirappalli)
Pidi monthan	Do.
51 ELA VAZHAI—	
Athiya kol	Assam
Aakku arati	Jagadevipet (Nellore); Pulivendla (Cuddapah); Madanapalle and Kalahasti (Chittoor)
Ela bale	Bangalore
Ela vazhai	Kozhumum (Coimbatore)
Ginja arati	Chellapalle (Krishna)
Kallu bale	Kundapur (South Kanara)
Kotta vazhai	Kancheepuram (Chingleput)
Verri arati	Tirupathi (Chittoor)
52 KATTU VAZHAI—	
Kattu vazha	Suryampath near Kalpatta and Anjillam near Manantoddy (Malabar)
Kallu vazha	Valparai—Anamalai hills
53 NAARU VAZHA (MUSA TEXTILIS NEE)—	
Kallu vazhai	Burliar (Nilgiris); Trichur (Cochin)
Manila	Kallar (Coimbatore); Trichur (Cochin)
Naaru vazha	Trichur (Cochin)
Natal bale	Veerajpet (Coorg)

APPENDIX II

Index of common and local names of the Madras Banana varieties

A

Aa bale ... 16
Aakku arati ... 51
Aakku bale ... 45
Aana guja bale ... 26
Aana poovan ... 21
Adakka poovan ... 23
Adakka kunnan ... 33
Adukkan or Adukkuan ... 33
Adukku namarai ... 24
Adukkupoovan ... 33
Alukehel ... 44
Alukehel ... 43
Amirthapani ... 21
Amirthapani ... 33
Anaikomban ... 4 (2)
Anaikomban ... 13
Anaikomban ... 14
Anamalu ... 15
Annaan ... 33
Apple ... 31
Aripoovan ... 21
Ari poovan ... 23
Athiya kol ... 51
Attu komban ... 13
Attu nendran ... 4 (2)
Aunda bale ... 45
Australian ... 10
Ayiramkuchchi ... 21
Ayiramkunnan ... 33
Ayiram poovan ... 21
Ayiranka poovan ... 21

B

Bachees ... 45
Bainsa kela or Bhainsu ... 45
Balli beya ... 28
Banga bale ... 45
Bangalore arati ... 31
Basarai ... 1
Basthi ... 45
Bathaas ... 45
Batheesa ... 45
Batisa bantal ... 45
Beet java ... 19
Benda arati ... 31
Bengala ... 21
Bengala ... 24
Bengala ... 28
Bental ... 47
Bhysi mowze ... 43
Blay suganthi ... 21
Bluefield ... 15
Bontha ... 45
Bontha ... 47
Bontha ... 47
Bontha arati ... 47
Bonha bale ... 39
Bonya kilandi ... 46
Booditha arati ... 37
Booditha arati ... 46
Booditha batheesa ... 46
Booditha bontha bathees ... 46
Booditha bontha ... 48
Boodithi ... 44
Boothan kaya ... 46
Boothi bale ... 39
Boothi bale ... 46
Boothi bale ... 44
Boothi javari ... 44
Boothi mathuranga ... 46
Buttam ... 21

C

Cadali or (Kaduli) ... 9
Cambur Morado ... 19
Chaker kelli ... 16
Chakkara kadali ... 16
Chakkarakeli ... 26
Chakkarakeli ... 16
Chakkarakeli ... 24
Chakkarakeli ... 28
Chakkarakeli ... 33
Chandra bale ... 19
Chara kaali ... 43
Chara kaali ... 44
Charakunnan ... 35
Chathura kali ... 43
Chathura monthan ... 47
Cheena bale ... 24
Cheena bale ... 29
Chengazhikodan ... 4
Chenkadali ... 19
Cheru kai ... 24
Cheru kunnan ... 35
Cheruvannan ... 28

N.B.—The numbers represent the serial number of the Madras Banana varieties,

Cheru vannan 30
Chetti kai 45
Chev (Tamil) 19
Chevvazhai 19
Chinali 7
Chinari 7
Chinga bale 5
Chingan 5
Chingan 28
Chingan 29
Chinna bontha 45
Chinna monthan 43
Chinna sugantham 33
Chitrachalam 36
Chitti bale 33
Chodari 14
Chontha bale 19
Chora kadali 19
Chora poovan 19
Chundi bontha 45
Chundilla kunnan 36
Chundillan 36
Chuvanna chevvazhai 19
Chuvanna kappa 19

D

Dacca Martaban 30
De kunnan 35
Deva bale 23
Devan (or Devar) kadali ... 9
Dorai vazhai 24
Dorai vazhai 28
Desi 21

E

Ela bale 51
Elakki bale 19
Elakki bale 23
Elakki bale 29
Elari 4 (2)
Ela vazhai 51
Ellaichi 21
Embul hondarawala 24
Embul hondarawala 30
Eradan 28
Erode bontham 45
Erode monthan 45
Erode naadan 28
Erode poovan 24
Erode vazhai 45
Ethara vazhai 30
Eththa chingan 6
Eththakka 4

F

Figue-la-rosa 15

G

Gaali bale 29
Giant Governor 2
Gidda arati 1
Ginja arati 51
Ginni 24
Ginni 33
Gobra bale 39
Godavari chakkarakeli ... 16
Godaveri keli 36
Green Red 19
Gros Michel 15
Gudlur bathees 45
Guja bale 1
Gujari bale 1
Guindy 21

H

Haavu bale 13
Hara mouze 1
Harichall 1
Hathi kela 13
Hoo bale 21
Hoo bale 23
Horn plantain 4
Htaw-bat 21
Huli bale 24

I

Irachchi kai 14
Irachchiketti kai 14
Isika bontha 47
Iyyan mannan 43

J

Jahaji kol 1
Jalakonda Mokiri 21
Jamaica banana 15
Janaka bale 29
Janaka bale 31
Javari 43
Jirika bale 33

K

Kaadu bale 29
Kaadu bale 30
Kaali 28
Kaali 29
Kaali eththan 4

Kaali thodan ... 30
Kaali vazhai ... 30
Katta bonthan ... 49
Kaattu bale ... 29
Kaattu kai ... 29
Kaattu vazha ... 52
Kaayivala ... 29
Kab bale ... 29
Kabul bale ... 1
Kabuli ... 1
Kadali (or Caduli) ... 9
Kadali ... 13
Kadali ... 23
Kadali ... 24
Kadali ... 28
Kadali poovan ... 23
Kai bale ... 29
Kaio ... 8
Kal eththan ... 4
Kal kadali ... 28
Kallattu vazhai ... 24
Kallu bale ... 51
Kallu monthan ... 50
Kallu vannan ... 43
Kallu vazhai ... 52
Kalyana bale ... 40
Kamalapuram ... 43
Kandi vazhai ... 1
Kannan ... 33
Kannan poonkalai ... 23
Kappa ... 19
Kappurapa keli ... 19
Kapur bale ... 31
Kari bale ... 24
Kari bale ... 43
Kari bale ... 45
Kari goddi ... 24
Karim kadali ... 19
Karim kadali ... 14
Kariputtu bale ... 24
Kari rasa bale ... 24
Kari vazha ... 14
Kari vazhai ... 1
Kari vazhai ... 16
Kari vazhai ... 17
Kari vazhai ... 18
Kari vazhai ... 19
Kari vazhai ... 24
Kari vazhai ... 32
Karkandu vazhai ... 21
Karpura ... 24
Karpura chakkarakeli ... 21
Karpura chakkarakeli ... 24
Karpura chakkarakeli ... 33
Karpurapu arati ... 23
Karpurapu keli ... 19
Karpura vazhai ... 40
Kaththe bale ... 36
Kaththe bale ... 47
Katta bontha ... 47
Katta kaali ... 30
Kempu bale ... 19
Kilandi ... 45
Klui ferong or kai ... 10
Klui naak ... 19
Kodapilla kunnan ... 36
Kolikuttu ... 21
Kombu bale ... 13
Komma arati ... 13
Konda arati ... 28
Kondai monthan ... 45
Konga bale ... 45
Kooli vazhai ... 1
Koombilla annaan ... 36
Koombilla chingan ... 36
Koombilla ka ... 36
Koombilla kannan ... 36
Koombilla poovan ... 36
Kooni vazhai ... 1
Koonthalai ... 47
Koorakayi chettu ... 47
Korangu ladan ... 28
Korangu naadan ... 30
Korangu pacha naadan ... 30
Korangu vazhai ... 24
Kostha bontha ... 40
Kothia ... 21
Kotta vazhai ... 37
Kotta vazhai ... 51
Kozhikkoottu vazhai ... 30
Kulamel kula ... 33
Kuli vazhai ... 1
Kullan ... 1
Kullan ... 26
Kulla vazhai ... 1
Kunkuma bale ... 19
Kunnan ... 33
Kunnan ... 36
Kunnan poovan ... 23
Kuppakkaali ... 45
Kuppa mannan ... 29
Kuri bontha ... 49
Kuthiravalan ... 27
Kuttaththi vazhai ... 1
Kutta vazhai ... 1
Kuzhi nendran ... 1
Kuzhi vazhai ... 26

L

Ladan ... 28
Ladan ... 30

Ladan ... 38
Ladda ... 28
Lal kel ... 19
Lal kel ... 20
Lal mowze ... 19
Lal velchi ... 24

M

Maanaattu monthan ... 45
Maanniyilla chingan ... 5
Manila ... 53
Mada vazhai ... 38
Madhura annaan ... 23
Madhuranga bale ... 45
Madras arati ... 33
Madras bale ... 13
Malabar ... 28
Malam poovan ... 19
Mala mundi ... 43
Mala vazhai ... 30
Malbhog ... 3
Malbhog kola ... 21
Mambilla ... 36
Mambilla kunnan ... 36
Mambilla poovan ... 36
Manchi chakkarakeli ... 16
Manga bale ... 45
Manila ... 53
Maniyilla kunnan ... 36
Mannan ... 28
Mannan ... 29
Manua kola ... 38
Manua kola ... 40
Mara bale ... 29
Mara bale ... 45
Marthamalu ... 19
Martinique ... 15
Matti ... 11
Mauritius ... 1
Mayil vazhai ... 38
Mendhibantal ... 43
Mhuskela ... 2
Mohan bansi ... 13
Mokiri ... 21
Monthan ... 45
Monthan ... 47
Moongil ... 4 (6)
Moonginsing ... 13
Morris vazhai ... 1
Morris vazhai ... 38
Motta poovan ... 24
Mula monthan ... 45
Mundila paadan ... 30
Mundi kunnan ... 35
Mundi vellapandan ... 30
Mutti kunnan ... 35
Mysore ... 24
Mysore bale ... 24
Mysore kadali ... 24
Mysore poovan ... 16
Mysore poovan ... 24
Mysore rasthali ... 16
Mysore rasthali ... 23
Mysori ... 24
Myndoli ... 39

N

Naadan ... 28
Naadan kunnan ... 33
Naadgangi ... 45
Naaru vazha ... 53
Naathangi monthan ... 45
Naattu chingan ... 28
Naattu ka ... 47
Naattu mannan ... 29
Naattu monthan ... 45
Naattu monthan ... 47
Naattu poovan ... 21
Naattu thuluvan ... 21
Naattu vazhai ... 43
Nachchingan ... 5
Naga bale ... 13
Naharam vazhai ... 38
Nalla bathees ... 45
Nalla chakkarakeli ... 17
Nalla mokri ... 17
Namarai ... 12
Nana nendran ... 4
Nanjangud bale ... 24
Nanjangud rasabale ... 21
Nar kadali ... 33
Natal bale ... 53
Navarai ... 24
Nedu nendran ... 4
Neechu ... 33
Nellore bontha ... 45
Nendran ... 4
Nendra padaththi ... 27
Nendra vannan ... 27
Nendra vazha (or bale) ... 4
Ney kadali ... 9
Ney kadali ... 23
Ney poovan ... 23
Ney vannan ... 37
Ney vannan ... 43
Ney vazha ... 37
Ney vazha ... 19

Nhali poovan 23
Nhani poovan 23
Nicaragua 4
Nielh bontha 45
Nila mutti 1
Nila vazhai 1
Nir bontha 45
Nivedya kadali 9
Nokala bontha 37

O

Onakkan mannan 39
Othu rasabale 24
Otta mukil 4 (6)

P

Pacha arati 1
Pacha arati 28
Pacha arati (or bale) 29
Pacha bale 28
Pacha bathees 45
Pacha bontha 47
Pacha bontha bathees 45
Pacha chevvazhai 19
Pacha chingan 5
Pachai 18
Pacha laadan 28
Pacha laadan 30
Pacha naadan 13
Pacha naadan 28
Pacha naadan 29
Pacha nala 28
Pacha vazhai (or bale) 1
Pacha vazhai 13
Pacha vazha (or bale) 28
Pacha vazha neeththal 3
Pacha vettan 19
Padachchi kai 29
Padalu 29
Padalu 30
Padaththi 28
Padaththi 29
Pada vazhai 29
Padinjaharan 43
Pakada kunnan 35
Pakki 29
Palakala bontha 37
Palakolu bontha 47
Palayankondan (or Palayan-
godan) 24
Palayanthodan 24
Pallu 21
Parangi 21
Patkapura 21
Pedda bontha 47
Pedda chakkarakeli 16
Pedda pachaarati 3
Pedda suganthan 21
Periya bonthan 47
Peyan 37
Peyan 38
Peyan 44
Pey laadan 38
Pey monthan 38
Pey monthan 43
Pey valam 37
Pey vazhai 38
Pichika bontha 47
Pidi bontha 49
Pidi monthan 38
Pidi monthan 50
Pindi eththan 4
Pisang brok bakul 24
Pisang bunga 19
Pisang embon 19
Pisang hijau 19
Pisang maas 10
Pisang masak hijau 15
Pisang nangka 45
Pisang rajah udang 19
Pisang serandah 1
Pisang tando 4 (6)
Pisang tandok (or talon) ... 4
Ponnan 45
Ponthan 45
Poo bale 21
Poo bale 23
Poola chundan 36
Poong kadali 33
Poong kadali 36
Poo suganthi 21
Poovan 21
Poovan 24
Poovan kadali 9
Poovan kadali 23
Poovalai (Tam.) 30
Poovilla konai 21
Poovilla vazhai 36
Poovodiya vazhai 21
Poo vazhai 24
Poo vazhai 28
Poo vazhai 36
Poovilla vazhai 36
Pottakali 29
Potti mokiri 33
Pulichan kadali 24
Pulippu kai 24
Puttu bale 22
Puttu bale 23
Puttu sugantha 23

Puwalu 24
Puwalu (Telugu) 30

R

Raja bale 16
Raja bale 23
Raja kili 16
Raja vazhai 16
Raja vazhai 40
Raktha kadali 19
Randava rakam chakkarakeli ... 19
Rasa aratti 26
Rasa bale 21
Rasa bale 24
Rasadala 23
Rasa kadali 23
Rasalu 26
Rasthali 16
Rasthali 21
Rasthali 24
Rasthali 37
Ratembala 19
Rundu bale 36

S

Sahaja 16
Sahara monthan 47
Saja arati 16
Sakalathi bale 19
Sal datti 31
Salem 24
Sambal 44
Sambal bonthan 48
Sambal vazhai 48
Samba kannan 35
Samba monthan 46
Samba poong kadali 34
Samba vazhai 44
Sambrani 40
Sambrani monthan 46
Sanna aakulu chettu ... 33
Sapota bontha 37
Savar gundy 37
Shwe-hinget-pyaw 19
Silanti 45
Silk 21
Singapuri 4 (6)
Siruguppa bale 21
Sirumalai 30
Soan mouze 24
Sodari 45
Sonkela 21
Sudha 33
Sufed velchi 23
Sugandha 24
Sugandhan 24
Sugandhi 24
Sugantha 21
Sugantha 30
Sugantham 21
Sugantham 23
Suganthan 33
Suganthi 21
Suganthi 21
Suriya kadali 10
Suwandel 36

T

Tenkasimala vazhai 30
Thattilla kunnan 36
Theeyan mannan 43
Theeyan vazhai 43
Thekkan kadali 23
Thekkan mannan 28
Thekkan poovan 19
Thella bathees 46
Thella bontha 48
Thella chakkarakali 16
Thella mokiri 21
Thenaali 45
Then kadali 16
Then kunnan 36
Then vazhai 4
Ther vazhai 20
Thezhuthani 45
Thezhuthani 47
Thihmwe 15
Thirunelli poovan 23
Thiruvannanthapuram ... 25
Thiruvodan 4
Thiruvonan 4
Thodan 28
Thoppul vazhai 45
Thotta arati 29
Thulunattu kadali 23
Thuluvan 19
Tirunolli kadali 33
Trichinopoly monthan ... 45

U

Udiri 30
Uduran 28
Uduran vazhai 30
Ullur monthan 47
Ullur poovan 21

V

Vaalieththan 4
Vadakkan kadali 23

Vahana arati 1
Valia kunnan 33
Valia thodan 30
Vamana arati 1
Vamana chakkarakeli 1
Vamana keli 1
Vannan 28
Vannan 29
Vannan 30
Vannan eradan 30
Vannan kaali 30
Vasana chettu 24
Vayakkattu kai 43
Vayal vazhai 43
Veenneer kunnan 35
Velchi 19
Velchi 23
Veleththan 4
Vella chevvazhai 19
Vellai chingan 29
Vellai kadali 33
Vella kadali 9
Vella kappa 19
Vella padan 28
Vella padan 29
Vella poovan 19
Vella vazhai 19
Vella vazhai 30
Velutha chenkadali 19
Venkadali 19
Venneettu kunnan 34
Venneettan 39
Venneettu mannan 44
Vennittu vannan 44
Vennittu manga 46
Vennittan thezhuthani 46
Verri arati 51
Vettan 14
Veyyikai arati 21
Vilayittu bale 24
Virupakshi 30

W

Wala 26
Watupalu 30
Wet-ma-lut 1
White Claret 19

Y

Yendra monthan 45
Yenuga arati 26
Yenthala monthan 45
Yerchi bale 24
Yerra arati 19
Yerra arati 24
Yerra chakkarakeli 19
Yerra mokiri 19
Yerra sugantham 24
Yeththan 4

APPENDIX III

Comparative statement showing weights of banana fruits and their connected parts in some common varieties

Variety (1)	Number of fruits (2)	Weight of bunch of fruits in lb. (3)	Weight of axis in lb. (4)	Percentage of axis to bunch of fruits (5)	Weight of unripe fruits in "hands" in lb. (6)	Percentage of unripe fruits in "hands" to bunch of fruits (7)	Weight of ripe fruits in "hands" in lb. (8)	Percentage of ripe fruits in "hands" to bunch of fruits (9)	Percentage of ripe fruits to unripe fruits (10)
1. *Chakkarakeli* ...	55	8 5/8	7/8	10·1	7 3/4	89·9	6 3/4	78·3	87·1
2. *Rasthali*	87	18 3/8	1 1/4	6·8	17 1/8	93·2	15 3/4	85·7	92·0
3. *Virupakshi*	67	10 5/8	1 1/8	10·6	9 1/2	89·4	8 1/2	80·0	89·5
4. *Sirumalai*	69	9 3/8	7/8	9·3	8 1/2	90·7	7 1/2	80·0	88·2
5. *Thenkunnan* ...	135	13 1/2	1 1/4	9·3	12 1/4	90·7	10 7/8	80·6	88·8
6. *Kapur*	66	19 5/8	1 3/8	7·0	18 1/2	93·0	16·0	81·5	87·7
7. *Neypoovan*	129	19 1/4	2·0	10·4	17 1/4	89·6	15 1/8	78·6	87·7
8. *Peyan*	87	10 7/8	1 1/8	10·3	9 3/4	89·7	7 7/8	72·4	80·8
9. *Pacha Naadan* ...	90	22·0	1 3/8	6·3	20 5/8	93·7	18 1/2	83·0	88·5
10. *Kunnan*	121	17 3/8	1 3/8	7·8	16 1/4	92·2	15 1/4	86·5	93·8
11. *Venneettin kunnan*	93	9 3/4	7/8	9·0	8 7/8	91·0	7 3/4	79·5	87·3
12. *Nendrapadaththi* ...	86	16 1/8	1 1/2	9·3	14 5/8	90·7	13 1/4	82·2	90·6
13. *Chingan*	56	7 1/4	3/8	5·2	6 7/8	94·8	5 3/4	79·3	83·6
14. *Suganthi*	81	18 1/2	1 1/2	8·1	17·0	91·9	14·0	75·7	82·8
15. *Krishnavazhai* ...	72	13 3/4	1 1/8	8·2	12 5/8	91·8	11 3/8	82·7	90·1
16. *Nalla chakkrakeli* ...	53	12·0	1/2	4·2	11 1/2	95·8	9 3/4	81·3	84·8
17. *Namarai*	87	7 1/4	1/2	6·9	6 3/4	93·1	5 7/8	81·0	87·0
18. *Peddapachaarati* ...	77	14 7/8	1·0	6·7	13 5/8	93·3	11 1/4	75·6	81·1
19. *Giant Governor* ...	90	21 1/8	1 1/4	5·9	19 7/8	94·1	16 3/8	77·5	82·4

Remarks.—A bunch of fruits of banana consists generally of 6 inches of peduncle, 3 inches of the part of the axis above the fruit region and the part of the axis which bears the fruits. The fruits are generally separated from the bunch in "hands."

APPENDIX IV

** Chemical analysis of pulp and rind of* (1) *ripe fruits,* (2) *unripe fruits used for culinary purpose of the Madras Banana varieties*

Variety (1)	Moisture (2)	Ash (3)	Protein (4)	Reducing sugars (5)	Non-reduing sugars (6)	Fat, other carbo-hydrates, etc. (7)	Total (8)
Vamanakeli—							
Pulp of ripe fruit	78·48	0·88	1·00	10·02	5·02	4·60	100·00
Rind of ripe fruit	72·43	1·83	1·00	...	...	24·74	100·00
Giant Governor—							
Pulp of ripe fruit	79·07	0·85	1·58	11·69	4·90	1·91	100·00
Rind of ripe fruit	88·65	2·16	1·14	...	...	8·05	100·00
Pedda pachaha arati—							
Pulp of ripe fruit	75·25	1·34	1·43	14·90	4·33	2·75	100·00
Rind of ripe fruit	87·00	2·07	1·27	...	...	4·66	100·00
Nendran—							
Pulp of ripe fruit	64·12	0·90	0·41	23·90	2·52	8·15	100·00
Rind of ripe fruit	72·43	3·34	1·88	...	...	22·35	100·00
Nendran forma Myndoli—							
Pulp of ripe fruit	65·19	0·92	1·50	21·68	2·12	8·59	100·00
Rind of ripe fruit	80·97	2·91	2·71	...	...	13·41	100·00
Moongil—							
Pulp of ripe fruit	60·61	1·26	1·13	11·48	9·17	16·35	100·00
Rind of ripe fruit	75·70	2·61	1·56	...	...	20·13	100·00
Moongil—							
Pulp of unripe fruit	60·43	1·05	1·81	...	...	† 36·71	100·00
Rind of unripe fruit	84·87	1·71	1·00	...	...	12·42	100·00

Chingan—							
Pulp of ripe fruit	69·74	1·06	1·33	15·59	4·95	7·33	100·00
Rind of ripe fruit	80·73	2·73	1·78	...	...	14·76	100·00
Eththa chingam—							
Pulp of ripe fruit	70·03	0·86	1·20	16·12	6·65	5·14	100·00
Rind of ripe fruit	82·89	2·59	1·46	...	...	14·06	100·00
Chinali—							
Pulp of ripe fruit	63·77	1·00	1·56	17·17	8·65	7·85	100·00
Rind of ripe fruit	75·34	3·20	2·94	...	...	18·52	100·00
Kaio—							
Pulp of ripe fruit	69·21	1·05	1·69	23·78	1·12	3·15	100·00
Rind of ripe fruit	86·48	2·75	1·70	...	...	9·07	100·00
Pulp of unripe fruit	72·44	1·27	1·81	...	...	24·48	100·00
Rind of unripe fruit	88·04	1·84	0·94	...	...	9·18	100·00
Kodali—							
Pulp of ripe fruit	69·69	0·82	1·63	6·12	13·07	8·67	100·00
Rind of ripe fruit	64·66	4·78	2·88	...	...	27·68	100·00
Matti—							
Pulp of ripe fruit	73·26	0·91	1·37	6·89	13·68	3·89	100·00
Rind of ripe fruit	82·02	2·88	1·60	...	...	13·50	100·00
Namarai—							
Pulp of ripe fruit	69·85	1·09	1·45	14·11	6·50	7·00	100·00
Rind of ripe fruit	73·47	3·21	2·39	...	...	20·93	100·00
Anaikomban—							
Pulp of ripe fruit	73·53	1·63	1·30	11·00	7·83	4·71	100·00
Rind of ripe fruit	84·64	2·12	1·42	...	...	11·79	100·00
Karim kadali—							
Pulp of ripe fruit	63·75	0·96	1·72	19·03	1·05	13·49	100·00
Rind of ripe fruit	78·81	3·17	1·47	...	...	16·55	100·00
Gros Michel—							
Pulp of ripe fruit	78·16	0·98	1·22	13·66	4·06	1·92	100·00
Rind of ripe fruit	86·72	2·30	0·99	...	...	9·99	

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* The analysis was made by the Government Agricultural Chemist, Agricultural College and Research Institute, Coimbatore

† Includes starch

APPENDIX IV—*cont.*

Chemical analysis of pulp and rind of (1) *ripe fruits,* (2) *unripe fruits used for culinary purpose of the Madras Banana varieties*—cont.

Variety	Nitrogen (9)	Potash (K_2O) (10)	Phosphoric acid (P_2O_5) (11)	Lime (CaO) (12)	Magnesium (MgO) (13)	Weight of single fruit in grams (14)	Percentage of pulp to fruit (15)	Percentage of rind to fruit (16)
Vamanakeli—								
Pulp of ripe fruit	0·16	0·52	0·055	0·12	Trace.	105	71·7	28·3
Rind of ripe fruit	0·16	1·10	0·11	0·11	Trace.	...	...	...
Giant Governor—								
Pulp of ripe fruit	0·25	0·47	0·057	0·018	...	110·3	74·55	25·45
Rind of ripe fruit	0·18	1·28	0·092	0·060	...	...	...	...
Pedda pachaha arati—								
Pulp of ripe fruit	0·23	0·59	0·057	0·089	0·092	115	76·50	23·50
Rind of ripe fruit	0·20	1·25	0·083	0·11	0·068	...	...	...
Nendran—								
Pulp of ripe fruit	0·06	0·51	0·077	0·094	0·095	210	78·77	21·23
Rind of ripe fruit	0·30	2·00	0·37	0·14	0·11	...	...	...
Nendran forma *Myndoli*—								
Pulp of ripe fruit	0·24	0·54	0·062	0·066	0·073	180	74·23	25·77
Rind of ripe fruit	0·43	1·76	1·16	0·091	0·082	...	...	...
Moongil—								
Pulp of ripe fruit	0·18	...	0·08	0·14	0·14	245	80·5	19·5
Rind of ripe fruit	0·25	...	0·094	0·44	0·20	...	...	...
Pulp of unripe fruit	0·29	...	0·079	0·026	0·006	...	...	...
Rind of unripe fruit	0·16	...	0·086	0·058	0·019	...	...	...

Chingan—											
Pulp of ripe fruit	...	...	...	0·21	0·53	0·070	0·060	0·080	75	80·68	19·32
Rind of ripe fruit	...	...	...	0·29	1·96	0·12	0·19	0·12	...	...	...
Eththa chingan—											
Pulp of ripe fruit	...	...	...	...	0·44	0·076	Trace.	...	59	75·5	24·5
Rind of ripe fruit	...	...	...	...	1·42	0·052	0·11	...	...	...	...
Chinali—											
Pulp of ripe fruit	...	...	...	0·25	...	0·059	0·015	...	90	66·86	33·14
Rind of ripe fruit	...	...	...	0·47	...	0·20	0·16	...	...	...	...
Kaio—											
Pulp of ripe fruit	...	...	...	0·27	0·61	0·080	0·065	0·065	155	84·26	15·74
Rind of ripe fruit	...	...	...	0·27	1·71	0·14	0·13	0·0057	...	...	...
Pulp of unripe fruit		...	...	0·29	...	0·094	0·016	...	160	69·34	30·66
Rind of unripe fruit	...	...	...	0·15	...	0·085	0·067	...	...	...	...
Kadali—											
Pulp of ripe fruit	...	...	...	0·26	...	0·076	0·011	...	31	85·59	14·41
Rind of ripe fruit	...	...	...	0·46	...	0·20	0·21	...	...	...	...
Matti—											
Pulp of ripe fruit	...	...	...	...	0·50	0·073	Trace.	...	24	77·27	22·73
Rind of ripe fruit	...	...	...	...	1·54	0·075	0·17	...	...	...	...
Namarai—											
Pulp of ripe fruit	...	...	...	0·23	0·56	0·069	0·081	0·073	35·7	80·26	19·74
Rind of ripe fruit	...	...	...	0·38	1·82	0·13	0·17	0·053	...	...	...
Aanai komban—											
Pulp of ripe fruit	...	...	...	0·21	0·52	0·058	0·085	0·090	126·25	69·35	30·65
Rind of ripe fruit	...	...	...	0·23	1·17	0·33	0·13	0·087	...	...	...
Karim kadali—											
Pulp of ripe fruit	...	...	...	0·25	0·51	0·052	0·091	0·075	102	78·91	21·09
Rind of ripe fruit	...	...	...	0·24	1·81	0·19	0·13	0·090	...	...	...
Gros Michel—											
Pulp of ripe fruit	...	...	...	0·20	0·52	0·056	0·020	0·068	121·3	73·91	26·09
Rind of ripe fruit	...	...	...	0·16	1·25	0·10	0·072	0·10	...	...	...

APPENDIX IV—*cont.*

Chemical analysis of pulp and rind of (1) ripe fruits, (2) unripe fruits used for culinary purpose of the Madras Banana varieties—cont.

Variety (1)	Moisture (2)	Ash (3)	Protein (4)	Reducing sugars (5)	Non-reducing sugars (6)	Fat, other carbo-hydrates, etc. (7)	Total (8)
Chakkarakeli—							
Pulp of ripe fruit	71·80	1·10	1·73	17·70	3·37	8·30	100·00
Rind of ripe fruit	79·69	2·12	1·94	...	...	16·25	100·00
Nalla chakkarakeli—							
Pulp of ripe fruit	79·84	0·90	1·11	15·04	3·01	0·10	100·00
Rind of ripe fruit	84·22	1·98	1·24	...	...	12·56	100·00
Kari vazhai—							
Pulp of ripe fruit	78·77	0·83	1·14	11·98	4·90	2·38	100·00
Rind of ripe fruit	82·49	1·64	1·26	...	...	14·61	100·00
Kari vazhai ecotype							
Manoranjitham—							
Pulp of ripe fruit	75·02	0·91	1·28	12·18	9·72	0·89	100·00
Rind of ripe fruit	79·98	2·72	1·60	...	...	15·70	100·00
Chenkadali—							
Pulp of ripe fruit	75·02	0·91	1·49	7·05	13·80	1·73	100·00
Rind of ripe fruit	81·39	2·50	1·58	...	...	14·53	100·00
Chenkadali forma *Venkadali*—							
Pulp of ripe fruit	74·47	0·87	1·56	3·64	14·62	4·84	100·00
Rind of ripe fruit	84·07	2·25	1·38	...	...	12·30	100·00
Rasthali—							
Pulp of ripe fruit	71·32	1·18	1·69	15·45	3·40	6·96	100·00
Rind of ripe fruit	79·09	3·01	3·06	...	...	14·84	100·00

Rasthali forma *Ayiranka rasthali*—							
Pulp of ripe fruit	68·57	1·42	1·27	14·63	7·89	5·22	100·00
Rind of ripe fruit	79·18	2·73	1·80	...	...	16·29	100·00
Suganthi—							
Pulp of ripe fruit	70·13	1·01	1·28	19·42	4·58	3·58	100·00
Rind of ripe fruit	66·99	4·12	3·28	...	...	25·61	100·00
Ney poovan—							
Pulp of ripe fruit	65·94	1·00	1·00	23·60	4·12	4·34	100·00
Rind of ripe fruit	66·61	4·57	3·76	...	...	25·06	100·00
Poovan—							
Pulp of ripe fruit	73·75	0·90	1·06	19·76	0·20	4·33	100·00
Rind of ripe fruit	83·90	1·86	1·14	...	...	13·10	100·00
Poovan forma *Motta poovan*—							
Pulp of ripe fruit	70·11	1·01	1·25	13·02	8·25	6·36	100·00
Rind of ripe fruit	76·90	3·52	1·88	...	...	17·70	100·00
Tiruvananthapuram—							
Pulp of ripe fruit	75·80	0·97	0·90	18·79	0·59	2·95	100·00
Rind of ripe fruit	72·70	3·78	1·80	...	...	21·71	100·00
Kullan—							
Pulp of ripe fruit	69·81	1·20	1·48	22·89	0·47	4·15	100·00
Rind of ripe fruit	80·93	2·92	2·61	...	...	13·54	100·00
Nendra padaththi—							
Pulp of ripe fruit	71·20	1·06	1·12	19·67	1·11	5·84	100·00
Rind of ripe fruit	84·31	2·01	1·80	...	...	11·88	100·00
Pacha naadan—							
Pulp of ripe fruit	71·11	1·18	1·04	18·75	2·19	5·73	100·00
Rind of ripe fruit	84·67	1·97	1·38	...	...	11·98	100·00
Kaali—							
Pulp of ripe fruit	71·37	1·01	1·00	22·03	0·62	3·97	100·00
Rind of ripe fruit	80·69	2·42	1·90	...	...	14·99	100·00
Vannan—							
Pulp of ripe fruit	70·34	0·96	1·17	20·58	3·23	3·72	100·00
Rind of ripe fruit	83·89	2·08	1·36	...	...	12·67	100·00

APPENDIX IV—*cont.*

Chemical analysis of pulp and rind of (1) *ripe fruits,* (2) *unripe fruits used for culinary purpose of the Madras Banana varieties*—cont.

Variety	Nitrogen (9)	Potash (K_2O) (10)	Phosphoric acid (P_2O_5) (11)	Lime (CaO) (12)	Magnesium (MgO) (13)	Weight of single fruit in grams (14)	Percentage of pulp to fruit (15)	Percentage of rind to fruit (16)
Chakkarakeli—								
Pulp of ripe fruit	0·26	0·62	0·097	0·037	0·035	120	69·0	31·0
Rind of ripe fruit	0·31	1·17	0·089	0·043	0·081	...	...	...
Nalla chakkarakeli—								
Pulp of ripe fruit	0·18	0·47	0·067	0·047	0·060	115	81·86	18·14
Rind of ripe fruit	0·20	1·14	0·089	0·11	0·060	...	...	...
Kari vazhai—								
Pulp of ripe fruit	0·18	0·46	0·066	0·049	0·072	125	82·2	17·8
Rind of ripe fruit	0·20	0·97	0·070	0·086	0·087	...	...	...
Kari vazhai ecotype								
Manoranjitham—								
Pulp of ripe fruit	0·20	0·47	0·083	0·070	0·076	120	80·69	19·31
Rind of ripe fruit	0·26	0·76	0·15	0·14	0·14	...	...	...
Chenkadali—								
Pulp of ripe fruit	0·24	0·51	0·062	0·099	0·087	175	79·28	20·72
Rind of ripe fruit	0·25	1·38	0·20	0·16	0·095	...	...	...
Chenkadali forma *Venkadali*—								
Pulp of ripe fruit	0·25	...	0·045	0·016	...	150	77·2	22·8
Rind of ripe fruit	0·22	...	0·10	0·10	...	...	...	...
Rasthali—								
Pulp of ripe fruit	0·24	0·54	0·081	0·032	0·073	100	84·0	16
Rind of ripe fruit	0·49	1·88	0·14	0·12	0·051	...	...	...

Rasthali forma *Ayiranka rasthali*—								
Pulp of ripe fruit	0·20	0·58	0·11	0·016	0·083	104·6	78·39	21·61
Rind of ripe fruit	0·29	1·28	0·11	0·044	0·073	...	...	...
Suganthi—								
Pulp of ripe fruit	0·21	0·57	0·071	0·067	0·066	135	90·53	9·47
Rind of ripe fruit	0·52	2·41	0·30	0·22	0·095	...	...	...
Ney poovan—								
Pulp of ripe fruit	0·16	0·53	0·068	0·071	0·090	65	91·76	8·24
Rind of ripe fruit	0·60	2·56	0·22	0·19	0·19	...	...	...
Poovan—								
Pulp of ripe fruit	0·17	0·48	0·060	0·025	...	76	77·76	22·24
Rind of ripe fruit	0·18	0·98	0·065	0·10	...	...	...	...
Poovan forma *Motta poovan*—								
Pulp of ripe fruit	0·20	...	0·081	0·020	...	55	79·34	20·66
Rind of ripe fruit	0·30	...	0·17	0·14	...	...	...	...
Tiruvananthapuram—								
Pulp of ripe fruit	0·14	0·50	0·049	0·022	0·084	70	79·24	20·76
Rind of ripe fruit	0·29	1·72	0·16	0·33	0·39	...	...	...
Kullan—								
Pulp of ripe fruit	0·24	0·57	0·070	0·023	...	67	78·59	21·41
Rind of ripe fruit	0·42	1·67	0·14	0·094	...	...	...	...
Nendra padaththi—								
Pulp of ripe fruit	0·18	0·54	0·063	0·086	0·082	165·8	69·74	30·26
Rind of ripe fruit	0·29	1·13	0·12	0·11	0·081	...	...	...
Pacha naadan—								
Pulp of ripe fruit	0·17	0·50	0·069	0·044	0·034	134	70·30	29·70
Rind of ripe fruit	0·22	1·21	0·11	0·069	0·064	...	...	...
Kaali—								
Pulp of ripe fruit	0·16	0·51	0·066	0·074	0·078	130	79·73	20·77
Rind of ripe fruit	0·30	1·33	0·14	0·12	0·079	...	...	...
Vannan—								
Pulp of ripe fruit	0·19	0·48	0·073	0·064	0·018	112	73·69	26·31
Rind of ripe fruit	0·22	1·10	0·12	0·099	0·11	...	...	...

APPENDIX IV—*cont.*

Chemical analysis of pulp and rind of (1) *ripe fruits,* (2) *unripe fruits used for culinary purpose of the Madras Banana varieties*—cont.

Variety (1)	Moisture (2)	Ash (3)	Protein (4)	Reducing sugars (5)	Non-reducing sugars (6)	Fat, other carbo-hydrates, etc. (7)	Total (8)
Vanan ecotype *Virupakshi*—							
Pulp of ripe fruit	68·74	0·96	1·08	22·71	1·20	5·31	100·00
Rind of ripe fruit	82·12	2·39	1·46	...	...	14·03	100·00
Vannan ecotype *Sirumalai*—							
Pulp of ripe fruit	69·93	0·97	1·03	22·14	1·48	4·45	100·00
Rind of ripe fruit	80·44	2·41	1·53	...	...	15·62	100·00
Kapur—							
Pulp of ripe fruit	73·91	1·28	1·08	18·68	2·05	3·07	100·00
Rind of ripe fruit	86·18	1·85	1·13	...	...	10·84	100·00
Kapur ecotype *Apple*—							
Pulp of ripe fruit	71·58	0·86	1·23	21·34	1·22	3·77	100·00
Rind of ripe fruit	76·98	2·83	1·96	...	...	18·23	100·00
Krishna vazhai—							
Pulp of ripe fruit	68·91	0·93	1·14	22·66	2·32	4·02	100·00
Rind of ripe fruit	79·18	2·74	1·65	...	...	16·43	100·00
Kunnan—							
Pulp of ripe fruit	67·66	1·40	1·02	21·57	2·41	59·4	100·00
Rind of ripe fruit	77·25	3·25	2·12	...	...	17·38	100·00
Vennettu kunnan—							
Pulp of ripe fruit	68·68	0·89	1·17	23·95	1·48	3·83	100·00
Rind of ripe fruit	73·81	3·60	2·79	...	...	19·80	100·00

Adakka kunnan—						
Pulp of ripe fruit	66·34	0·85	1·38	13·10	10·74	7·59	100·00
Rind of ripe fruit	76·23	2·97	3·00	...	...	17·80	100·00
Thean kunnan—							
Pulp of ripe fruit	61·83	0·90	1·41	21·53	3·48	10·85	100·00
Rind of ripe fruit	76·86	2·88	2·47	...	...	17·79	100·00
Thean kunnan forma *Thatillakunnan*—							
Pulp of ripe fruit	61·75	1·18	1·55	19·10	1·68	14·74	100·00
Rind of ripe fruit	83·05	3·01	2·37	...	...	11·57	100·00
Peyan—							
Pulp of ripe fruit	65·73	1·02	0·94	9·40	7·68	15·23	100·00
Rind of ripe fruit	81·19	1·97	0·82	...	...	16·02	100·00
Pey ladan—							
Pulp of ripe fruit	66·28	0·84	1·10	22·95	Nil.	8·83	100·00
Rind of ripe fruit	80·98	2·42	1·52	...	...	15·08	100·00
Pey ladan forma *Mayilvazhai*—							
Pulp of ripe fruit	65·79	0·82	1·03	19·63	1·00	11·73	100·00
Rind of ripe fruit	84·84	2·05	1·20	...	...	11·91	100·00
Boothi bale—							
Pulp of ripe fruit	67·45	1·22	1·06	21·91	2·59	5·77	100·00
Rind of ripe fruit	70·52	2·10	2·50	...	...	24·88	100·00
Kostha bontha—							
Pulp of ripe fruit	65·28	1·01	1·31	24·60	0·72	7·08	100·00
Rind of ripe fruit	78·14	3·13	1·83	...	...	16·90	100·00
Pay kunnan—							
Pulp of ripe fruit	68·77	0·98	0·99	18·26	0·26	10·64	100·00
Rind of ripe fruit	76·83	2·81	2·45	...	...	17·91	100·00
Enna benian—							
Pulp of ripe fruit	64·13	0·87	1·13	20·10	2·23	11·54	100·00
Rind of ripe fruit	69·72	2·77	1·06	...	...	26·45	100·00
Ney mannan—							
Pulp of ripe fruit	70·13	0·70	0·86	23·16	0·65	4·50	100·00
Rind of ripe fruit	84·76	1·37	1·20	...	...	12·67	100·00

APPENDIX IV—*cont.*

Chemical analysis of pulp and rind of (1) *ripe fruits,* (2) *unripe fruits used for culinary purpose of the Madras Banana varieties*—cont.

Variety	Nitrogen	Potash (K_2O)	Phosphoric acid (P_2O_5)	Lime (CaO)	Magnesium (MgO)	Weight of single fruit in grams	Percentage of pulp to fruit	Percentage of rind to fruit
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Vannan ecotype *Virupakshi*—								
Pulp of ripe fruit	0·17	0·52	0·070	0·066	0·077	85	76·79	23·21
Rind of ripe fruit	0·23	1·37	0·14	0·076	0·099	...	...	...
Vannan ecotype *Sirumalai*—								
Pulp of ripe fruit	0·17	0·50	0·072	0·073	0·071	90	77·11	22·89
Rind of ripe fruit	0·25	1·35	0·12	0·13	0·093	...	...	...
Kapur—								
Pulp of ripe fruit	0·17	0·73	0·11	0·094	0·064	192·4	70·69	29·31
Rind of ripe fruit	0·18	0·69	0·17	0·093	0·073	...	...	...
Kapur ecotype *Apple*—								
Pulp of ripe fruit	0·20	0·45	0·075	0·081	0·067	160	86·39	13·61
Rind of ripe fruit	0·31	1·47	0·085	0·25	0·14	...	...	...
Krishna vazhai—								
Pulp of ripe fruit	0·18	0·52	0·078	0·061	0·053	95	76·08	23·92
Rind of ripe fruit	0·26	1·48	0·15	0·10	0·084	...	...	...
Kunnan—								
Pulp of ripe fruit	0·16	0·50	0·059	0·094	0·072	65	85·09	14·91
Rind of ripe fruit	0·34	1·88	0·19	0·19	0·15	...	...	...
Vennettu kunnan—								
Pulp of ripe fruit	0·19	0·46	0·097	0·070	0·080	60	88·18	11·82
Rind of ripe fruit	0·45	2·06	0·26	0·16	0·18	...	...	...

Adakka kunnan—								
Pulp of ripe fruit	0·22	...	0·055	0·015	...	47	83·20	16·80
Rind of ripe fruit	0·48	...	0·14	0·14	...	...	...	...
Thean kunnan—								
Pulp of ripe fruit	0·23	0·46	0·077	0·038	0·091	77	82·47	17·53
Rind of ripe fruit	0·39	1·69	0·17	0·087	0·10	...	...	...
Thean kunnan forma *Thatillakunnan*—								
Pulp of ripe fruit	0·25	0·47	0·074	0·081	0·078	80	74·78	25·22
Rind of ripe fruit	0·38	1·66	0·16	0·039	0·10	...	...	...
Peyan—								
Pulp of ripe fruit	0·15	...	0·092	0·029	0·093	52	52·10	47·90
Rind of ripe fruit	0·13	...	0·050	0·100	0·15	...	...	...
Pey ladan—								
Pulp of ripe fruit	0·18	0·46	0·064	0·056	0·089	74·2	66·71	33·29
Rind of ripe fruit	0·24	1·39	0·11	0·14	0·14	...	...	...
Pey ladan forma *Mayilvazhai*—								
Pulp of ripe fruit	0·18	0·42	0·14	0·078	0·075	88	53·53	46·47
Rind of ripe fruit	0·19	1·02	0·17	0·12	0·081	...	...	...
Boothi bale—								
Pulp of ripe fruit	0·17	...	0·066	0·033	...	63	75·48	24·52
Rind of ripe fruit	0·40	...	0·14	0·12	...	...	...	...
Kostha bontha—								
Pulp of ripe fruit	0·21	0·39	0·071	0·073	0·080	68·36	75·13	24·87
Rind of ripe fruit	0·29	1·71	0·18	0·18	0·20	...	...	...
Pay kunnan—								
Pulp of ripe fruit	0·16	0·48	0·069	0·042	0·066	64·1	83·75	16·25
Rind of ripe fruit	0·39	1·61	0·088	0·19	0·16	...	...	...
Enna benian—								
Pulp of ripe fruit	0·18	...	0·12	0·024	...	57	62·03	37·97
Rind of ripe fruit	0·17	...	0·15	0·15	...	...	...	...
Ney mannan—								
Pulp of ripe fruit	0·14	0·36	0·055	0·037	0·062	150	67·91	32·09
Rind of ripe fruit	0·19	0·75	0·084	0·046	0·044	...	...	...

APPENDIX IV—*cont.*

Chemical analysis of pulp and rind of (1) *ripe fruits,* (2) *unripe fruits used for culinary purpose of the Madras Banana varieties*—cont.

Variety (1)	Moisture (2)	Ash (3)	Protein (4)	Reducing sugars (5)	Non-reducing sugars (6)	Fat, other carbo-hydrates, etc. (7)	Total (8)
Vennettu mannan—							
Pulp of ripe fruit	68·42	0·82	0·95	21·50	0·66	7·65	100·00
Rind of ripe fruit	84·22	1·66	1·53	...	...	12·59	100·00
Monthan—							
Pulp of ripe fruit	71·57	1·44	1·00	15·24	3·66	7·09	100·00
Rind of ripe fruit	75·32	2·69	1·19	...	...	20·80	100·00
Pulp of unripe fruit	70·60	1·15	1·75	...	...	26·50	100·00
Rind of unripe fruit	86·38	2·08	1·44	...	...	10·10	100·00
Pacha montha bathees—							
Pulp of ripe fruit	71·32	1·01	1·23	13·98	0·59	11·87	100·00
Rind of ripe fruit	85·72	1·77	1·39	...	...	11·12	100·00
Pulp of unripe fruit	72·13	1·05	1·12	...	...	25·70	100·00
Rind of unripe fruit	89·56	1·46	1·08	...	...	7·90	100·00
Sambrani monthan—							
Pulp of ripe fruit	66·36	0·91	1·19	18·31	0·96	12·27	100·00
Rind of ripe fruit	80·04	2·31	1·44	...	...	16·21	100·00
Pulp of unripe fruit	70·81	0·89	1·19	...	...	27·11	100·00
Rind of unripe fruit	86·36	1·37	1·06	...	...	11·21	100·00
Booditha montha bathees—							
Pulp of ripe fruit	66·46	1·00	0·96	18·21	0·39	12·98	100·00
Rind of ripe fruit	85·69	1·96	1·49	...	...	10·86	100·00

Pulp of unripe fruit	68·03	1·08	1·04	...	...	29·85	100·00
Rind of unripe fruit	88·32	1·40	1·13	...	...	9·15	100·00
Nalla bontha—							
Pulp of ripe fruit	67·26	0·89	1·15	20·97	0·34	9·39	100·00
Rind of ripe fruit	83·87	2·04	1·39	...	...	12·70	100·00
Pulp of unripe fruit	68·41	1·05	1·22	0·18	0·46	28·68	10·000
Rind of unripe fruit	86·24	1·67	1·11	0·42	1·10	9·46	100·00
Thella bontha—							
Pulp of ripe fruit	67·64	0·96	1·27	19·25	0·22	10·66	100·00
Rind of ripe fruit	84·35	1·66	1·76	...	...	12·23	100·00
Pulp of unripe fruit	67·22	1·08	1·06	0·12	0·46	30·06	100·00
Rind of unripe fruit	85·70	2·01	1·15	0·49	1·16	9·49	100·00

APPENDIX IV—*cont.*

Chemical analysis of pulp and rind of (1) *ripe fruits,* (2) *unripe fruits used for culinary purpose of the Madras Banana varieties*—cont.

Variety	Nitrogen (9)	Potash (K_2O) (10)	Phosphoric acid (P_2O_5) (11)	Lime (CaO) (12)	Magnesium (MgO) (13)	Weight of single fruit in grams. (14)	Percentage of pulp to fruit (15)	Percentage of rind to fruit (16)
Vennettu mannan—								
Pulp of ripe fruit	0·15	0·42	0·064	0·070	0·084	131·2	69·97	30·03
Rind of ripe fruit	0·25	0·98	0·14	0·090	0·080	...	...	...
Monthan—								
Pulp of ripe fruit	0·16	...	0·087	0·018	...	235	77·73	22·27
Rind of ripe fruit	0·19	...	0·080	0·14	...	...	...	...
Pulp of unripe fruit	0·28	...	0·12	0·021	...	240	58·76	41·24
Rind of unripe fruit	0·23	...	0·054	0·062	...	...	...	...
Pacha montha bathees—								
Pulp of ripe fruit	0·19	0·56	0·091	0·010	0·059	163·7	60·21	39·79
Rind of ripe fruit	0·22	1·06	0·069	0·033	0·054	...	...	...
Pulp of unripe fruit	0·18	0·56	0·086	0·014	0·070	174	59·19	40·81
Rind of unripe fruit	0·17	0·81	0·064	0·023	0·038	...	...	...
Sambrani monthan								
Pulp of ripe fruit	0·19	...	0·073	0·013	...	230	68·89	31·11
Rind of ripe fruit	0·23	...	0·051	0·055	...	...	...	...
Pulp of unripe fruit	0·19	...	0·081	0·013	...	235	61·45	38·55
Rind of unripe fruit	0·17	...	0·040	0·047	...	...	...	...
Booditha montha bathees—								
Pulp of ripe fruit	0·15	0·57	0·091	0·012	0·057	165	71·22	28·78
Rind of ripe fruit	0·24	1·11	0·076	0·065	0·036	...	...	...

Pulp of unripe fruit	0·17	0·57	0·092	0·016	0·071	179·5	63·79	36·21
Rind of unripe fruit	0·18	0·83	0·044	0·018	0·032	...	...	...
Nalla bontha—								
Pulp of ripe fruit	0·18	0·48	0·082	0·022	0·084	210	66·84	33·16
Rind of ripe fruit	0·22	1·06	0·10	0·099	0·14	...	...	...
Pulp of unripe fruit	0·19	0·51	0·094	0·034	0·10	229·1	58·39	41·61
Rind of unripe fruit	0·18	0·77	0·075	0·10	0·10	...	...	...
Thella bontha—								
Pulp of ripe fruit	0·20	0·53	0·10	0·064	0·079	205	65·44	34·56
Rind of ripe fruit	0·28	1·28	0·15	0·15	0·11	...	...	...
Pulp of unripe fruit	0·17	0·68	0·082	0·041	0·083	216	60·19	39·81
Rind of unripe fruit	0·18	0·91	0·087	0·092	0·11	...	...	...

APPENDIX V

Chemical analysis of some common Indian fruits

(1)	Moisture (2)	Ash (3)	Crude proteins (4)	Ether Ext. Fat (5)	Crude Fibre (6)	Carbo hydrates (7)	Calcium (Ca) per cent (8)	Phosphorous (P) per cent (9)	Iron (Fe) Mgs. per cent (10)	Carotene international Vitamin A units per 100 gms. (11)	Vitamin B international units per 100 gms. (12)	Vitamin C gms. per 100 gms. (13)	Calorific value per 100 gms. (14)	Calories per oz. (15)
Banana	61·4	0·7	1·3	0·2	1·6	36·4	0·01	0·05	0·4	Trace	50	1	153	43
Apple	85·9	0·3	0·3	0·1	1·2	13·4	0·01	0·02	1·7	Do.	40	2	56	16
Orange	87·8	0·4	0·9	0·3	...	10·6	0·05	0·02	0·1	350	40	68	49	14
Grapes	85·5	0·4	0·8	0·1	3·0	10·2	0·03	0·02	0·4	15	Trace	3	45	13
Pineapple	86·5	0·5	0·6	0·1	0·4	12·0	0·02	0·01	0·9	60	...	63	60	14
Mango	86·1	0·3	0·6	0·1	1·1	11·8	0·01	0·02	0·3	4,800	Poor	13	50	14

BIBLIOGRAPHY

1 ALPHONSO DE CANDOLLE, " Origin of cultivated plants", pp. 306–308, 1884.

2 AYKROYD, W. R., " The nutritive value of Indian foods and the planning of satisfactory diets ", *Health Bulletin*, No. 23, pp. 38–40, 1941.

3 AYYAR, T. V. R., " Handbook of Economic Entomology for South India ", *Insect affecting fruit trees—Banana*, 1940.

4 AYYAR, T. V. R., " Nettle grub pest of the banana plant in South India ", *Indian Journal of Entomology*, 4, pp. 171–172, 1942.

5 BAKER, J. G., " A synopsis of the genera and species of Museæ ", *Annals of Botany*, VII, pp. 189–222, 1893.

6 BAILEY, L. H., " Cyclopaedia of American Horticulture ", II, p. 1038, 1903.

7 BARNES, H., " A wireway for bananas ", *Queensland Agricultural Journal*, 57, pp. 207–211, 1943.

8 BERTA AND HADER, E., Green and Gold, " The story of the banana, 1936 ".

9 BERTNELL, H. R., " The banana in relation to human nutrition ", *Tropical Agriculture*, 17, pp. 143–146.

10 BHAT, S. S., " Basrai banana in Baroda ", *Indian Farming*, 3, pp. 588–589, 1942.

11 BRUNNICH, J. C., " The manuring of bananas ", *Trans., 3rd Inter. Cong. Trop. Agri.*, 2, p. 422, 1924.

12 BURMEISTER, G., " Bananas in wartime ", *Agri. Amer.*, 5, pp. 63–66 and 74–75, 1945.

13 BURNS, W. AND DANI, P. G., " Some facts and figures regarding banana cultivation ", *Agri. Jour. India*, XV, p. 386, 1920.

14 BURNS, W. AND JOSHI, P. G., " The drying of bananas ", *Agri. Journal India*, 15, p. 166, 1920.

15 CALDWELL, N. E. H., " Brown paper bunch covers for the control of banana rust; thrips ", *Queensland Dept. Agri. and Stock*, pamphlet, 72, 1940.

16 CHEEMA, G. S. AND BHAT, S. S., " Banana breeding at the Imperial College of Tropical Agriculture, Trinidad," *Indian Journal of Agricultural Science*, VI, pp. 484–501.

17 CHEESMAN, E. E., " Genetics and Cytological studies of Musa ", *Journal of Genetics*, 26, pp. 291–316, 1932.

18 CHEESMAN, E. E., " Principles of banana breeding ", *Dept. of Trop. Agri. XI*, 1934.

19 CHEESMAN, E. E. AND LARTER, L. N. H., " Genetical and Cytological studies of Musa ", *Journal of Genetics*, pp. 31–51, 1935.

20 Chevalier, A., " Observations on some wild and cultivated bananas," 1934.

21 Choma, B. L., " Preliminary Investigations on the diseases of bananas occurring in the Punjab and their method of control", *Indian Journal of Agri. Science*, III, pp. 673–687.

22 Cooke, T., " The flora of the Presidency of Bombay", p. 742, 1908.

23 Croucher, H. H., " The future of the Banana Industry in Jamaica", *Journal of Jamaica, Agri. Soc.*, XLVI, pp. 119–121, 1942.

24 Dodds, K. S. and Pittendrigh, C. S., " Genetical and Cytological studies of Musa, VII, Certain aspects of polyploidy ", *Jour. of Genetics*, 47, pp. 162–177, 1946.

25 Eddy, W. H., " The nutritive value of the banana ", *Columbia University, Bur. Pubs.*, 1933.

26 Fawcett William, " The Banana, its cultivation, distribution and commercial uses ", 1913.

27 Fishlock, W. C., " A banana industry for the Gold Coast", *West African Agri. Conf.*, p. 224, 1929.

28 Froggatt, J. L., " The banana thrips ", *Dept. of Agric. and Stock, Queensland*, Ento. Leaflet No. 7.

29 Froggatt, J. L., " Dusting with calcium cyanide for banana thrips control ", *Res. and Dev. of the Cyanogas Calcium by Moore*, p. 6, 1926.

30 Gamble, J. S., " The flora of the Presidency of Madras", p. 1497, 1928.

31 Haines, H. H., " The Botany of Bihar and Orissa, p. 1127, 1924.

32 Hoette Shirley, " Certain aspects of Investigations on Black end disease of Bananas in Australia ", *Austr. Coun. Sci. and Industrial Research*, Pampt. 58, 1934.

33 Hooker, J. D., " The Flora of British India, VI, p. 262, 1894.

34 Howes, F. N., " The banana in some tropical Eastern countries—its forms and variations ", *Bulletin of Miscellaneous Information*, pp. 305–331, 1928.

35 Huxley Julian, " The New Systematics ", *Mutations and Geographical variation*, pp. 73–128, 1940.

36 Jacob K. Cherian, " South Indian Bananas ", *The Madras Agricultural Journal*, XXII, pp. 41–56.

37 Jacob K. Cherian, " A fasciated inflorescence in a banana ", *Journal of the Bombay Natural History Society* ", 40, p. 5 1.

38 Jacob K. Cherian, " Bananas of the Travancore State ", *Madras Agri. Journal*, 30, pp. 277–287, 1942.

39 Jehangir Fardunji Dastur, " A rot of bananas ", *Agri. Jour. of India*, 10, p. 278, 1915.

40 Jehangir Fardunji Dastur, " Spraying for Ripe-rot of the plantain fruit ", *Agri. Journal India*, 11, p. 142, 1916.

41 Jogi Raju, G., " Cultivation of plantains in wet lands in Godavari Delta, *Madras Agri. Dept. Bull.* 93, 1925.

42 Joshi, A. C., " A note on the determination of sex of plantain flowers ", *Journal of Genetics*, 38, pp. 353–356.

43 Karmarkar, D. V. and Joshi, V. M., " Cold storage of Indian Fruits," *Indian Farming*, I, pp. 173–177.

44 Kulkarni, L. B., " The drying of plantains at Agashi ", *Agri. Journal India*, 6, p. 289, 1911.

45 Larter, L. N. H., " Sports of the Gros Michel ", *Journal of the Jamaica Agri. Society*, August 1934.

46 Larter, L. N. H., " Hybridism in Musa ", *Journal of Genetics*, XXXI, pp. 297–316, 1935.

47 Leach, R., " Banana leaf spot Mycosphaerella Musicola. The perfect stage of Cercospora musae Zimm. " *Trop. Agri.* 18, pp. 91–95, 1941.

48 Leach, R., " Soil conditions affecting production of Perithecia in Banana leaf spot," *Nature*, 151, p. 199, 1943.

49 Leach, R., " Banana leaf spot investigations, 1. The basis of control", *Dept. Sc. and Agric. Jamaica, Bull.* No. 26.

50 Leonard, E. R., " The banana trade from the West Indies to Canada", *Trop. Agri.* 18, pp. 244–246, 1941.

51 Linnaeus, " Species Plantarum, II, pp. 1477–1478.

52 Magee, C. J. P., " Investigation on the Bunchy Top disease of the banana ", Melbourne, Bulletin No. 30, *Commonwealth of Australia*, 1927.

53 Mandke, V. G. and Burns, W., " The inflorescence and flowers of the banana, Musa sapientum and its wild relative M. superba," *Pro. of the 4th Ind. Sc. Congress*, p. 51, 1917.

54 Maximov, N. A., " Text Book of Plant Physiology," pp. 288–295 1930.

55 Minneman, P. G., " The Banana circles the globle ", *Agric. Ameri.* II, pp. 123–127, 1942.

56 Naik, K. C., " Dehydrated banana products and their food value", *Madras Agri. Journal*, 31, pp. 342–351, 1943.

56a Naik, K. C., " Banana Fibre Investigations", *The Indian Journal of Horticulture*, 3, pp. 14–28, 1945.

57 Narayana Iyer, K. R., " Preparation of plantain ' Figs ', " *Pro. 1st meeting of the Bd. of Agri. Travancore*, p. 49, 1936.

58 Narayana Nayar, P., " The Nendran or Malabar plantain ", *Madras Agri. Journal*, 29, pp. 470–473, 1941.

9 Norris, R. V. and Ramasami Iyer, C. V., " The nitrogen and the mineral requirements of the plantain ", *Agri. Journal of India*, 20, p. 463, 1925.

60 Nowell William, " Diseases of crop-plants in the Lesser Antilles ", pp. 241–248.

61 Popenoe, W., " Banana culture around the Caribbean ", *Trop. Agric.*, 18, pp. 33–38, 1941. Do. pp. 8–12.

62 Proudlock, R. L., " Note on simple machines for extracting plantain fibre ", *Madras Agri. Dept. Bull.*, 77, 1919.

63 Ponnambalam Pillai, T. " The cultivation of banana in Travancore ", *Agri. Jour. India*, V. p. 252, 1910.

64 Quisumbing y Arguelles Eduardo, " Studies of Phillippine Bananas ", *The Phillippine Agricultural Review*, XII, No. 3, pp. 1–74, 1919.

65 Ranganathan, S., " Carbohydrate changes in the plantain during ripening ", *Pro. 13th Ind. Sc. Congress*, p. 33, 1926.

66 Rangaswami Iyengar, C., " Study of a Fusarium isolated from wilted plantains, " *Madras Agri. Dept. Year Book*, p. 16, 1929.

67 Reichert, I. and Hellinger, E., " On Botrytis tip end rot of banana fruit in Palestine ", *Repr. ' Hadar '* 5, No. 7, 1932.

68 Reynolds, P. K., " The story of the banana ", 1926.

69 Rheede, " Hortus Malabaricus ", I, pp. 17–20.

70 Rose, W. V., " Banana ", *Nyasaland Agri. Quar. Jour.* 5, pp. 90–92, 1945.

71 Roxburgh William, " Flora Indica ", I, pp. 663–669, 1832.

72 Roy, D. L., " Banana, plantain, Musa paradisiaca ", *The Crops of Bengal*, p. 177, 1906.

73 Rutty, F. S., " Food value of Banana ", *Journal of Jamaica Agric. Soc.*, 45, p. 334, 1941.

73-a Savur, G. R. and Sreenivasan, A., " Studies on Pectins from Indigenous Sources ". *Journal of Scientific and Industrial Research*, 5B, pp. 41-43.

74 Scarseth, G. D., " Growing bananas on arid soil ", *Agri* Amer. 4, pp. 188-189, 1934.

75 Schumann, K., " Das Pflanzenreich ", IV, part 45, pp. 19-20.

76 Shortt, J., " The Musaceae or Plantain order ", *Ind. Agri.*, p. 228, 1889.

77 Simmonds, J. H., " Plant diseases and their control ", pp. 10-25, 1938.

78 Simmonds, P. L., " The plantain and Banana ", *Trop. Agric.*, p. 455, 1877.

79 Smart, H. P., " Sigatoka leaf diseases of Bananas (Sarcospora leaf spot), *Dept. Agri. Br. Honduras leaflet* 3.

80 Smith, F. E. V., " *Panama disease of banana in Jamaica, Dept. Sc. Agri. Jamaica, Mycrobiological Bull. No.* 1, 1932.

81 Stephens, S. E., " Banana culture in Trop. Queensland ", *Queensland Agri. Journal*, 60, pp. 137 153.

2 Thorald, C. A., " Cultivation of bananas under shade for the control of leaf spot diseases ", *Trop. Agric.* 17, pp. 213-214, 1940.

83 THORNTON, N. C., " Carbon di oxide storage, XIV, the influence of carbon di oxide, oxygen and ethylene on the Vitamin C content of ripening bananas ", *Contr. Boyce Thompson Inst.*, 13, pp. 201-220, 1944.

84 TRIMEN, H., " A Hand-book of the Flora of Ceylon ", IV, p. 265 1898.

85 VENKATARAMANI, K. S., "Studies on Indian bananas, I. A descriptive studies of 24 varieties ", *Proc. Ind. Acad. Sci. Sec.* B., 23, pp. 113-128, 1946.

86 WATT GEORGE, " Dictionary of the Economic Products of India ", V. pp. 290-306, 1891.

87 WARD, F. S., " Cercospora leaf spot of bananas ", *Dept* of *Sci. and Agri. Jamaica, Bull. No.* 15, 1938.

8 WARDLAW, C. W., " Diseases of the banana ", pp. 14-131, 264-266, 1935.

89 WARDLAW, C. W., " Tropical fruits and vegetables. An account of their storage and transport ", *Tropical Agriculture* (Trinidad, XIV, pp. 76-82, 1937.

90 WARDLAW, C. W., " The Banana in Central America ", *Nature*, 147, pp. 313-316.

91 WARDLAW, C. W., " Preliminary observations on the refrigerated gas storage of Gros Michel banana ", *Trop. Agric.* 17, pp. 103-105, 1940.

2 WARDLAW, C. W., " Banana research at the Imp. College of Trop. Agri. Trinidad, B.W.I., " *Journal Roy. Soc. Arts*, XC, pp. 644-654.

93 WARDLAW, C. W., and LEONARD, E. R., " Studies in tropical fruits ", *Annals of Botany, New Series, III*, pp. 27-42.

94 WARDLAW, C. W., and McGuire, L. P., " The behaviour and disease of the banana in storage and transport ". *Proc. Imp. Hort. Conf.*, Pt. III, p. 52, 1931.

95 WARDLAW, C. W., and MCGUIRE, L. P., " Control of wastage in bananas with special reference to time and temperature factors, 1942.

96 WEDDELL, J. A., " Banana Weevil borer, " *Queensland Agri. Journal*, 60, pp. 85-89, 1945.

97 WILLDENOW, " Linnaei Species Plantaum " V, pp. 893-895.

98 WULFF, E. V., " Introduction to the Historical Geography of Plants ", pp. 325-335, 1932.

BULLETINS AND LEAFLETS

99 " Bananas and Minerals, *Chemical and Indust.*, 19, p. 145, 1945.

100 " Area of plantain " *Season and Crop reports* (Madras), 1943-1944.

101 "Average weight of a bunch of a banana", *Trop. Agri.*, 22, pp. 231-232, 1945.

102 " Banana fertiliser investigations in Jamaica ", *Nature* 147, p. 618, 1941.

103 " Banana and minerals, *Trop. Agri.*, 22, pp. 175-176, 1945.

104 " Banana recipes ", *Dept. of Agri., Madras, leaflet* No. 117, 1943.

105 " Bunchy Top diseases of plantains", *Indian Farming* 6, pp. 239-240, 1945.

106 " Dehydrating bananas in Sao Paulo, Brazil ", *Agric. Amer*, 3, p. 138, 1943.

107 " Dried bananas for Coeliac patients," *Food manufacture*, 19, p. 221, 1944.

108 " The banana ", *Trop. Agri.*, 97, pp. 138-142.

109 " The manufacture of dried banana products ", *Bull. Imperial Inst.* XXXIX, pp. 25-29, 1941.

110 " Marketing of banana ", *J. Sci. Ind. Res. India*, 4, p. 427.

111 " Nutritional value of banana ", *Planters' Chronicle*, 35, pp. 534-535.

112 " Plantain " *Reports on the work of the Agricultural Stations in the Madras Presidency* for 1937-1938, pp. 97-105.

113 " Plaintain stalks as fodder for cattle in famine years " *Bomb. Agri. Dept. Bull. No.* 1, 1919.

114 " Report of the Jamaica Banana Commission", 1936.

115 " Soil conditions affecting production of Perithecia in banana leaf spot disease " *Trop. Agri.*, 20, p. 184, 1943.

116 " Species and Principal varieties of Musa", *Bulletin of Miscellaneous Information*, pp. 227-314, 1894.

117 " List of the important insects injurious to cultivated crops in South India " *The Madras Agricultural Dept. Bulletin No.* 86.

118 " Banana recipes", Commonwealth Banana Committee, Melbourne.

INDEX

A

PAGES

Abnormalities, Inflorescence ... 18, 19
Abnormalities, Shoot ... *19*
Adakka Kunnan ... *97*–99
After cultivation ... 137
Anaikomban ... 14, *57*–59
Analysis—" figs " ... 157
Analysis—Flour ... 158
Analysis—Ripe banana ... *165*, 166
Anthers—black in Kaali Group ... 9, 18, 21
Anthracnose of banana ... *151*
Apex—of fruit ... 8
Apple ... 92, 93
Area—Banana ... 4
Artificial key, Banana Varieties ... 32–36
Axis—Fruit bearing ... 14
Ayiram kunnan ... 23, 96
Ayiranka kunnan ... 22
Ayiranka rasthali ... *74*, 22

B

Baker, J. G. ... 7, 9
Banana—analysis ... *165*–166
Banana—Area of ... 4
Banana beverage ... 161
Banana ' candy ' ... 161
Banana chips ... 161
Banana—chromosome numbers ... 25, 26
Banana coffee ... 161
Banana—description ... 13–19
Banana—dietics ... 162–164
Banana " figs " ... 155
Banana flour ... 157–159
Banana—flowers ... 15
Banana—forcing ... 145
Bunches—freakish emergence ... *152*
Banana fritters ... 161
Banana ' halva ' ... 160
Banana—History of ... 2–3
Banana jam ... 159
Banana jelly ... 160
Banana meal ... 158

Italicised numbers indicate illustration

B—*cont.*

	PAGES
Banana and Plantain—Synonyms	5, 6
Banana products	158–162
Banana—roots in	*13*
Banana—seeds	18
Banana varieties, artificial key	32–36
Banana varieties—description of	37
Banana varieties—origin	21–26
Banana varieties—standardised common names	32–33
Banana wilt	*150*, 151
Bathees	22
Beverage	161
Bonana	5
Bontha	6, 10
Booditha montha bathees	22, *119*, 120
Boothe bale	*105*–107
Bracts	14
Bunches—multiple	*19*
Bunchy Top—causes	148
Bunchy Top—control	149–150
Bunchy Top—symptoms	148

C

Canary Islands banana	7, 37
Candy	161
Cavendish	9, 37
Chakkarakeli	*62*–66, 14, 24
Chenkadali	*68*, 69
Chinali	49–51
Chingan	6, *46*, 47, 14
Chips	161
Chromosome numbers	25, 26
Classification—Linnaeus	7
Climatic conditions—suited for	1
Coconut—intercrop in	140
Coffee—banana	161
Commercial varieties	133, 134
Compost—from banana	147
Cross-pollination—in nature	18
Cultivated Banana—nomenclature of	7–11
Cultivation—after	137
Cultivation—economics	141–143
Cultivation—for fruits and leaves	144
Cultivation—for leaves, stems	144
Cultivation—intensive	143
Cultivation—in Malabar	140
Cultivation—Nendran in Malabar	140

Italicised numbers indicate illustrations

PAGES

C—*cont.*

Cultivation—preparatory ... 136
Cultivation—Vamanakeli ... 143
Cultural practices ... 135
Cultural practices, variations ... 25
Currency—Indian ... 1

D

Description of banana ... 13–19
Description of varieties ... 37
De-suckering ... 138
Diplodia rot ... 151
Diseases ... 147–153
Diseases—Anthracnose ... *151*
Diseases—Bunchy Top ... *148*, 149
Dietics ... 162–164
Diseases—Diplodia ... 157
Diseases—Leaf and fruit speck ... 152
Diseases—Panama ... *150*–151
Disease—Physological ... 152
Dorai vazhai ... 24
Double shoot—abnormality ... *21*
Dwarf chinese ... 37
Dwarf Jamaica ... 37

E

Ecological Types ... 21, 23
Economics—of banana cultivation ... 141–143
Ela Vazhai ... 2, *127*–129
145
Eleri ... 44
Elevation ... 136
Enna benian ... *110*, 111
Eththa Chingan ... *48*, 49, 14

F

Fasciation—in inflorescences ... *18*
Fibre ... 147
" Figs "—varieties suitable ... 155, 156,
" Figs "—Analysis ... 157
" Figs "—Banana ... 155
Flour—Analysis ... 158
Flour—banana ... 157–159

PAGES

F—*cont.*

Flour—opinions on ... 158, 159
Flour—varieties suitable ... 158
Flowers ... 15
Forcing of banana ... 145, 146
Freakish emergence of bunch ... *152*
Fritters ... 161
Fruit—apex ... 8
Fruit—odour ... 8
Fruits—behaviour under different temperature ... 3

G

Gamble, J. S. ... 9
Giant Governor ... 7, 9, *39*, 40
Governor ... 37
Green red ... 21
Gros Michel ... *60*–62
Groups, varieties ... 28, 29

H

'Halva' ... 160
"Hands" ... 15
"Heart"—different types ... *14*, 15
"Hearts"—removal ... 139
Height ... 9, 13
History of banana ... 2–4
Home of bananas ... 2
Hortus Malabaricus ... 2
House, F. N. ... 7

I

Inflorescence—abnormalities ... 18, 19
Inflorescence—variations in ... *15*–17
Insect pests ... 152, 153
Intensive cultivation—table variety ... 143

J

Jam ... 159
Jamaica—Dwarf ... 37
Jelly ... 160

K

Kaali ... 8, 86, 87, 88
Kaali—group ... 8, 9
Kaali group—anthers black... 9, 18, 21
Kaali eththan ... 44

Italicised numbers indicate Illustrations

PAGES

K—*cont.*

Kadali ... *52*, 53, 14
Kaio ... *51*, 52
Kaleththan ... *44*
Kallu monthan ... 8, *126*, 127
Kapur ... *91*, 92
Karim Kadali ... *59*, 60
Karivazhai ... 8, *66*, 67, 14 24
Key—artificial ... 32–36
Kostha bontha ... *107*, 108
Krishna Vazhai ... *93*, 94, 14, 24
Kullan ... 6, *81*, 83, 9
Kunnan ... *94*–96
Kuri bontha ... *125*, 126

L

Leaf and fruit speck ... 152
Leaves—varieties suitable ... 145, 146
Linnaeus ... 6, 7
Linnaeus—classification ... 7

M

Macrophoma Musae ... 152
Malbhog ... 40
Manniyilla chingam ... *47*, 48
Manoranjitham ... 8, 67, 68
Manures and manuring ... 138
Matti ... *55*, 56, 14
Mayilvazhai ... *104*, 105
Medicinal uses ... 147
Mhuskela ... 39
Monthan ... *114*, 116, 6, 10, 14, 22
Moongil ... *45*, 46, 22
Motta poovan ... 8, 79, 80, 22
Multiple bunches ... 19
Musa balbisiana colla. ... 2, *127*
Musa Cavendishii Lamb. ... 10
Musa Chinensis Sweet ... 37
Musa kattuvazhana Sp. Nov. ... 2, *129*
Musa paradisiaca L. ... 5, 6, 8, 10, 11
Musa Sapidisiaca K.C. Jacob Nom. Nov. ... 10, 11
Musa Sapidisiaca var. *aanaikombaniana* ... *57*
Musa sapidisiaca var. *adakkakunnaniana* ... *97*
Musa sapidisiaca var. *boothibaleiana* ... *105*

Italicised numbers indicate illustrations

PAGES

M—*cont.*

Musa spidisiaca var. cavendishii 10, *37*
Musa sapidisiaca var. chakkarakeliana *62*
Musa sapidisiaca var. *chakkarakeliana* ecotype *rajabaleana* 64
Musa sapidisiaca var. *chakkarakeliana* ecotype *rajavazhiana* ... 64
Musa sapidisiaca var. *champa* forma *ayirankarasthaliana* *74*
Musa sapidisiaca var. *champa* (Hort.) Jacob *72*
Musa sapidisiaca var. *chinaliana* *49*
Musa sapidisiaca var. *chinganiana* *46*
Musa sapidisiaca var. *chinganiana* forma *manniyillachinganiana* ... *47*
Musa sapidisiaca var. *corniculata* (Rumph.) Jacob *45*
Musa sapidisiaca var. *ennabenianana* *110*
Musa Sapidisiaca var. *eththachinganiana* *48*
Musa sapidisiaca var. *giantgovernorana* *39*
Musa sapidisiaca var. *granulata* *80*
Musa sapidisiaca var. *grosmicheliana* *60*
Musa sapidisiaca var. *kaaliana* *86*
Musa sapidisiaca var. *kadaliana* *52*
Musa sapidisiaca var. *kaiona* *51*
Musa sapidisiaca var. *kallumonthaniana* *126*
Musa sapdisiaca var. *kapuriana* *91*
Musa sapidisiaca var. *kapuriana* ecotype *appleiana* 92
Musa sapidisiaca var. *karimkadaliana* *59*
Musa sapidisiaca var. *karivazhaiana* *66*
Musa sapidisiaca var. *karivazhaiana* ecotype *manoranjithamiana* ... *67*
Musa sapidisiaca var. *kosthabonthana* *107*
Musa sapidisiaca var. *kullaniana* *81*
Musa sapidisiaca var. *kunnaniana* *94*
Musa sapidisiaca var. *kunnaniana* type *ayiramkunnaniana* 96
Musa Sapidisiaca var. *Kuribonthana* *125*
Musa Sapidisiaca var. *krishnavazhaiana* *93*
Musa sapidisiaca var. *mattiana* *55*
Musa sapidisiaca var. *monthaniana* *114*
Musa sapidisiaca var. *monthaniana* forma *pachamonthabatheesiana* ... *116*
Musa sapidisiaca var. *nallabonthana* *120*
Musa sapidisiaca var. *nallabonthana* forma *nallabonthabatheesiana* ... *122*
Musa sapidisiaca var. *nallachakkarakeliana* *65*
Musa sapidisiaca var. *namaraiana* *56*
Musa sapidisiaca var. *nendrapadaththiana* *83*
Musa sapidisiaca var. *neymannaniana* *111*
Musa sapidisiaca var. *neypoovaniana* *76*
Musa sapidisiaca var. *pachanaadaniana* *85*
Musa sapidisiaca var. *peddapachchaaratiana* *40*
Musa sapidisiaca var. *peyaniana* *101*
Musa sapidisiaca var. *peykunnaniana* *108*
Musa sapidisiaca var. *peyladaniana* *103*
Musa sapidisiaca var. *peyladaniana* forma *mayilvazhaiana* *104*

PAGES

M—*cont.*

Musa sapidisiaca var. *plantaniana* ... *42*
Musa sapidisiaca var. *plantaniana* forma *eleriana* ... 44
Musa sapidisiaca var. *plantaniana* forma *kaaliehthaniana* ... 44
Musa sapidisiaca var. *plantaniana* forma *myndoliana* ... 45
Musa sapidisiana var. *plantaniana* forma *velaththaniana* ... 45
Musa sapidisiaca var. *poovaniana* ... *77*
Musa sapidisiaca var. *poovaniana* forma *mottapoovaniana* ... *79*
Musa sapidisiaca var. *rubra* (Firminger) Jacob ... *68*
Musa sapidisiaca var. *rubra* forma *venkadaliana* ... *70*
Musa sapidisiaca var. *sambranimonthaniana* ... *117*
Musa sapidisiaca var. *sambranimonthaniana* forma *boodithamontha batheesiana* ... *119*
Musa sapidisiaca var. *sannachenkadaliana* ... *70*
Musa sapidisiaca var. *suganthiana* ... *75*
Musa sapidisiaca var. *suryakadaliana* ... *83*
Musa sapidisiaca var. *thaenkunnaniana* ... *99*
Musa sapidisiaca var. *thattillakunnaniana* ... *100*
Musa sapidisiaca var. *thellabonthana* ... *123*
Musa sapidisiaca var. *vannaniana* ... *88*
Musa sapidisiaca var. *vannaniana* forma *sirumalaiensis* ... *90*
Musa sapidisiaca var. *vannaniana* forma *virupakshiensis* ... *89*
Musa sapidisiaca var. *venneetukunnaniana* ... *96*
Musa sapidisiaca var. *veneettumannaniana* ... *113*
Musa sapientum L. ... 5, 6, 8, 10, 11
Musa sinensis sagot ... 37
Musa teatilis nee ... *131*, 133
Myndoli ... 45

N

Naaru vazha ... *131*–133
Nalla bontha ... 22, 142, 144 *120*–122
Nalla bontha bathees ... 22, *122*, 123
Nalla chakkarakeli ... *65*, 66, 14
Namarai ... *56*, 57, 14
Names—standardised common names ... 30–32
Names of varieties ... 28–36
Nanjangud rasabale ... 25
Nendran ... 5, 8, 22, *42*, 43
Nendran—cultivation in Malabar ... 140
Nendran—forcing ... 145
endran—suckers preparation ... 141
Nendra padaththi ... 6, 83, *84*, 85, 9

Italicised numbers indicate illustrations

PAGES

N—*cont.*

Ney mannan ... *111*, 112
Ney poovan ... *76*, 77, 14
Nomenclature of the cultivated Banana ... 7–11

O

" Onam " ... 141, 145
Origin—Banana varieties ... 21–26

P

Pacha montha bathees ... 22, *116*, 117
Pacha naadan ... *85*, 86
Panama disease ... *150*, 151
Panama disease—control ... 151
Panama disease—symptoms ... 150
Panama wilt ... 150
" Panchamirtham " ... 23, 52, 161
" Pandal " ... 1
Paper currency—Indian ... 1
" Pazhaprathaman " ... 161
Pedda paccha arati ... 7, 9, *40*–42
Peduncle ... 14
Perianth ... 17
Pests ... 152, 153
Pests—control ... 153
Peyan ... *101*–103
Pey kunnan ... *108*–110
Pey ladan ... *103*–104
Pisang tando ... 22
Pistil ... 18
Plantain and Banana—synonyms ... 6, 6
Planting—rhizome ... 137
Planting season ... 137
Poovan ... 8, 14, 22, 24, 25, 77, 78, *79*
Pothu vazhai ... 143
Preparatory cultivation ... 136
Propping ... 139
Pseudostem ... 14
Pulippu kai of Pollachi ... 25

R

Rajabale ... 64, 24
Rajabale of Virajpet ... 24

Italicised numbers indicate illustrations

R—*cont.*

PAGES

Rajavazhai ... 64, 24
Rasa bale—Nanjangud ... 25
Rasthali ... 72–74, 22, 25
Red Jamaica ... 21
Rhizomes for planting ... 137
Roots in Banana ... *13*
Root system ... *13*

S

Sambrani monthan ... 22, *117*, 118
Sanna chenkadali ... *70*, 71
Season of planting ... 137
Seeded varieties ... 2
Seeds—bananas ... 18
Shoot—abnormalities ... 19
Sirumalai ... *90*, 91, 23
Soil ... 136
Spacing ... 137
Sports ... 21, *22*
Stamens ... 17, 18
Staminate flowers ... 17
Staminate flowers—variations ... *17*
Standardised common names—Banana varieties ... 30–32
Suckers—preparation in Nendran ... 141
Sunganthi ... 74, 75, 76
Suryakadali ... *33*–55, 14

T

Table variety—intensive cultivation ... 143
Temperatures and fruits ... 3
Thaen kunnan ... 22, *99*–100
"Thandu" ... 1
Thattilla cunnan ... 22, *100*, 101
Thella bontha ... 22, *123*–125
Thiruvananthapuram ... *80*, 81
Types, Ecological ... 21, 23

U

United Fruit company ... 3
Uses ... 146, 147, 155

V

Vamanakeli ... 6, 7, 9, *37*, 38, 39
Vamanakeli—cultivation in Sadras ... 143

Italicised numbers indicate illustrations

V—*cont.*

PAGES

Vannan ... *88*, 89, 23
Variations, cultural practices ... 25
Variations in inflorescence ... 15–17
Variations—in Staminate flowers ... 17
Varieties of Banana, artificial key ... 32–36
Varieties—commercial ... 133, 134
Varieties—for leaves ... 145, 146
Varieties, groups ... 28, 29
Varieties-names of ... 28–36
Varieties-origin ... 21–26
Varieties—seeded ... 2
Varieties—suitable for "figs" ... 155, 156
Varieties—suitable for flour ... 158
Velaththan ... 45
Venkadali ... 70, 21
Venneethu kunnan ... *96*
Venneethu mannan ... *113*, 114
Virupakshi ... *89*, 90, 23

W

White claret ... 21
Windbrake—planting ... 139

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